NO. 91

CONTENTS

TRADE NAME AND MODEL	SET AND FOLDER NO.
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AIR KING Tel. Rec.	
A1016	91-2
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84GAA3967A	91-3
EMERSON	
643A (Ch. 120111A)	91-4
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226	91-5
HALLICRAFTERS Tel. Rec.	
T54	91-6
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514	91-6
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MISC. Record Changer	
Series 700R	91-8
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50-1726	91-9
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SILVERTONE	
1301 (Ch. 319.190)	91-11
SPARTON	
150, 151, 152 (Ch. 4E10)	91-12
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TELE-TONE Tel. Rec.	
TV-250	91-13
TV-254	91-13
WESTINGHOUSE Tel. Rec.	
H217B (Ch. V-2146-35DX, V-2137, V-2149)	91-14
WESTINGHOUSE	
H-302P5 (Ch. V-2151-1)	91-15

NO. 91A

CONTENTS

TRADE NAME AND MODEL	SET AND FOLDER NO.
AIRLINE	
84HA3002B Tel. Rec.	91A-2
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CROSLEY	
9-423M Tel. Rec.	91A-4
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802 Tel. Rec.	91A-7
MOTOROLA	
VT121 (Ch. TS-15) Tel. Rec.	91A-9
PHILCO	
49-1002, 49-1040 (Code 121); 50-T1600, 50-T1632, 50-T1633 Tel. Rec.	91A-10
RCA VICTOR	
S1000 (Ch. KCS31-1, RC617B); 9TW390 (Ch. KCS31-1, RC617A); 641TV (Ch. KCS25A-1, KCS25C-2, RK-117A, RS-123A) Tel. Rec.	91A-11
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Chassis	
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Model	
G2322Z, G2327Z, G2340Z, RZ, G2350Z, RZ, G2353EZ, G2356EZ Tel. Rec. (See Ch. 23G24)	91A
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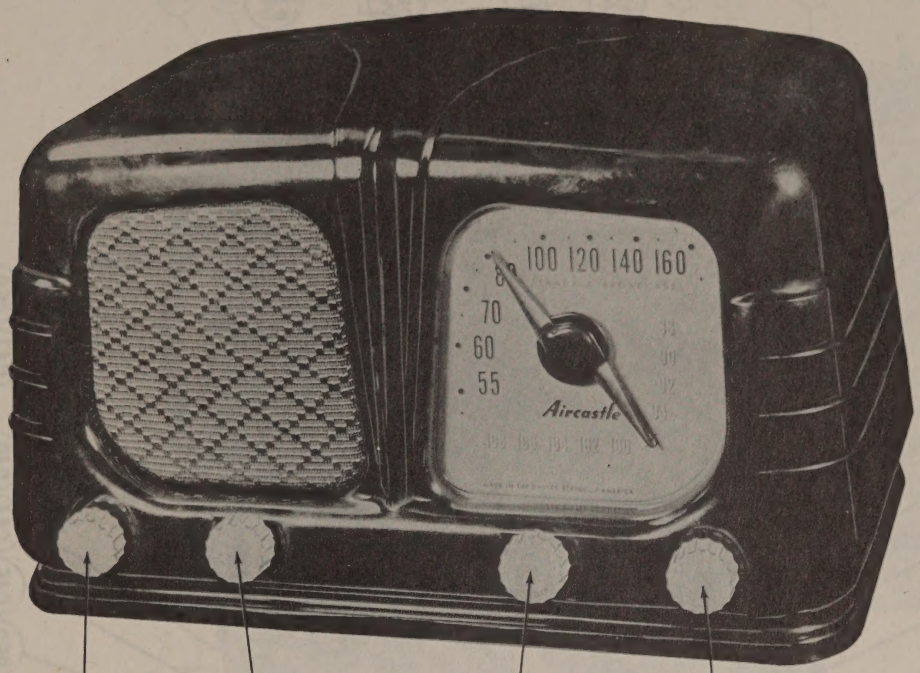
G3259RZ, G3262Z, G3275RZ, 3276G Tel. Rec. (See Ch. 24G26 and 8G20/22)	91A

91A—1, 5, 6, 8 SUPERSEDED BY PHOTOFACT FOLDERS

AIRCASTLE
MODEL WEU-262



VOLUME CONTROL
ON-OFF SWITCH

TONE CONTROL

TUNING CONTROL

BAND SWITCH

AIRCASTLE
MODEL WEU-262

AIRCASTLE MODEL WEU-262

TRADE NAME	Aircastle, Model WEU-262		
SUPPLIER	Spiegel Inc., 1061 W. 35th St., Chicago, Illinois		
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna		
TUBES (EIGHT)	Types 6BA6 RF Amp., 6BE6 Converter, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 Ratio Det., 6SQ7 DET-AVC-AF, 25L6GT Power Output, 25Z6GT Rectifier		
POWER SUPPLY	110-120 Volts AC	RATING	.44 Amp. at 117 Volts AC
TUNING RANGE-BROADCAST	535-1620KC	FREQ. MOD.	88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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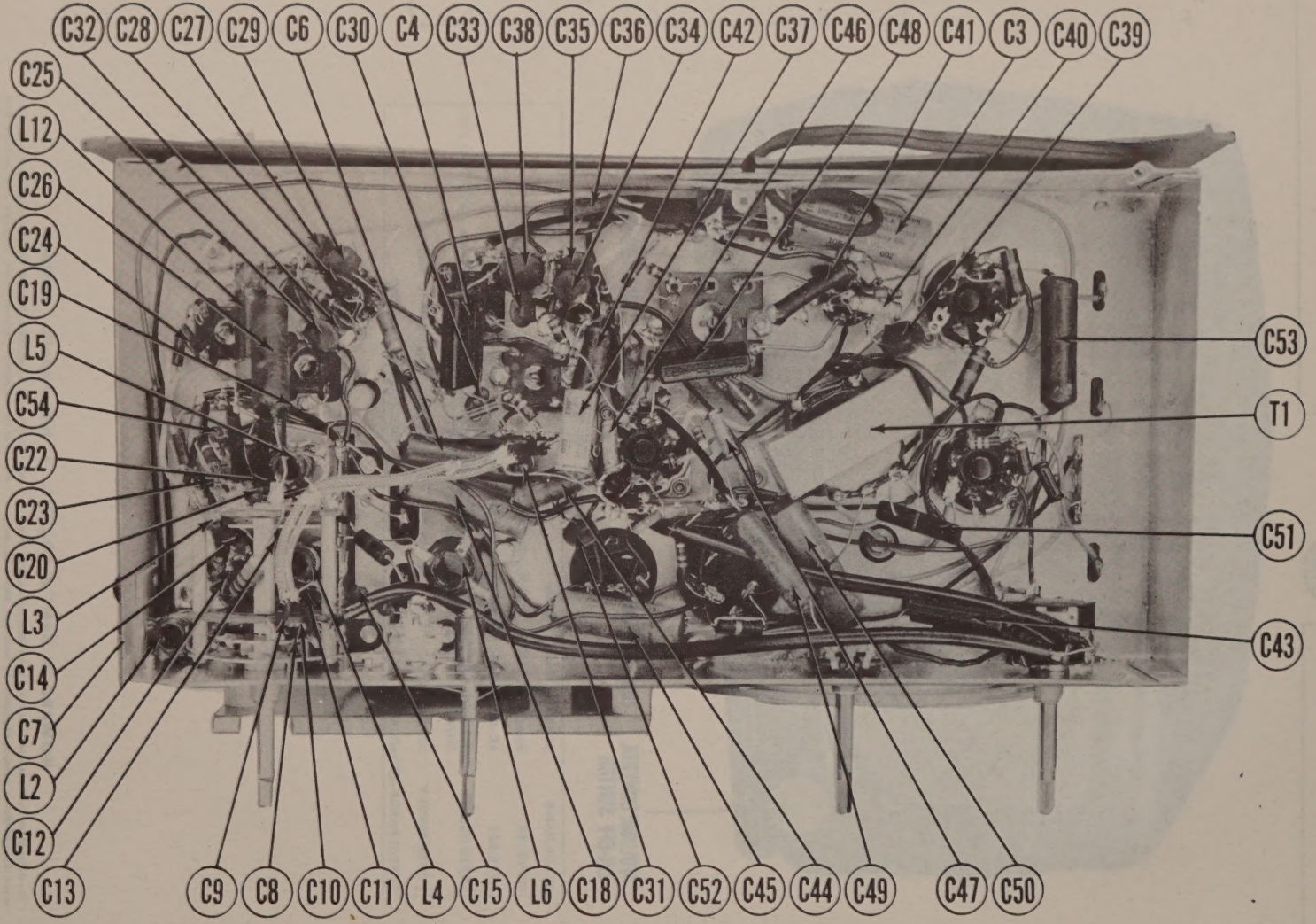
C32
C28
C27
C29
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C30
C4
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C38
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C34
C42
C37
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C48
C41
C3
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C9
C8
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C11
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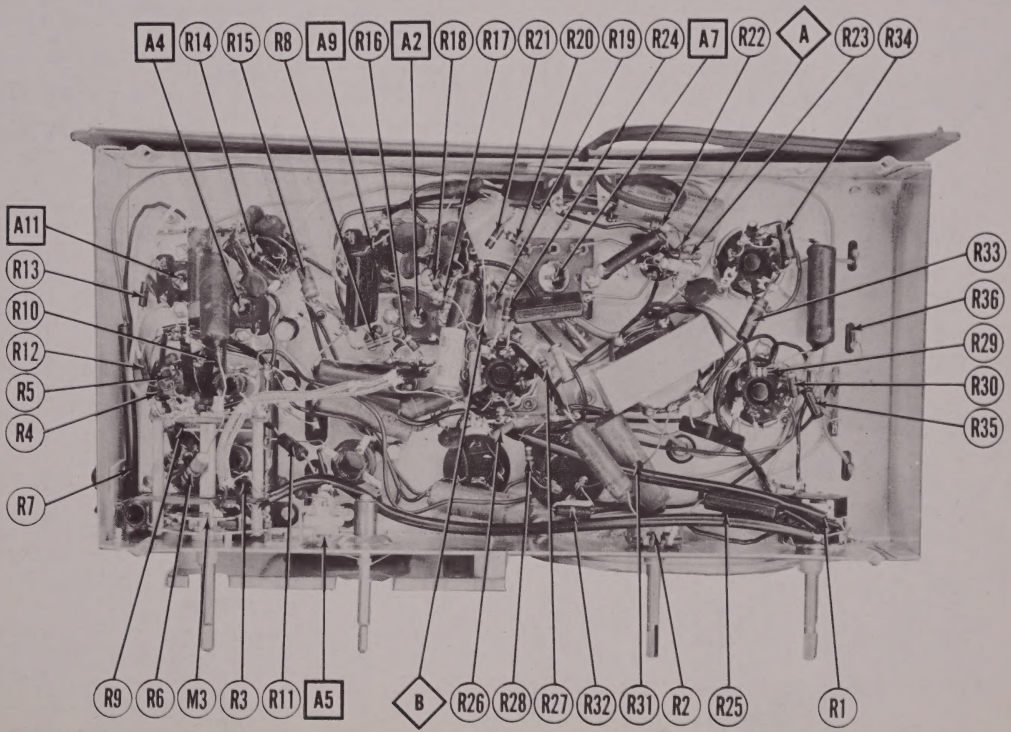
C31
C52
C45
C44
C49
C47
C50
C53
T1
C51
C43


A4
R14
R15
R8
A9
R16
A2
R18
R17
R21
R20
R19
R24
A7
R22
A
R23
R34
A11
R13
R10
R12
R5
R4
R7
R33
R36
R29
R30
R35
R9
R6
M3
R3
R11
A5
B
R26
R28
R27
R32
R31
R2
R25
R1

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
In steps 2 and 3, fashion a loop of several turns of wire and radiate the signal from the signal generator into the loop of the receiver.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (Grid) of 6BE6 (V2). Low side to B-.	455KC (400 ∿ Mod.)	AM (CCW)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If two peaks are noted on any adjustment, use the one with the slug farthest out.
2.		Loop	1620KC	"	"	"	A5	Adjust for maximum output.
3.		Loop	1400KC	"	Tune for max. output.	"	A6	Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point A to B-. The junction of these two resistors is alignment point C as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	250MMF	High side to pin 1 (Grid) of 6BA6 (V4). Low side to B-.	10.7MC (Unmod.)	FM (CW)	Tuning gang fully open	DC Probe to Point (A). Common to B-.	A7	Adjust for maximum deflection.
5.	250MMF	"	"	"	"	DC Probe to Point (B). Common to Point (C)	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	250MMF	High side to Pin 1 (Grid) of 6BA6 (V3). Low side to B-.	"	"	"	DC Probe to Point (A). Common to B-.	A9, A10	Adjust for maximum deflection.
7.	250MMF	High side to pin 7 (Grid) of 6BE6 (V2). Low side to B-.	"	"	"	"	A11, A12	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	250MMF	High side to pin 1 (Grid) of 6BA6 (V3). Low side to B-.	10.7MC (450KC Mod.)	FM (CW)	Tuning gang fully open	Vert. Amp. to Point (A). Low side to B-.	A7, A9, A10	Disconnect stabilizer capacitor C3. Adjust for maximum amplitude and symmetry as per Fig 1.
5.	250MMF	High side to pin 7 (Grid) of 6BE6 (V2). Low side to B-.	"	"	"	"	A11, A12	"
6.	250MMF	"	"	"	"	Vert. Amp. to Point (B). Low side to B-.	A8	Reconnect capacitor C3. Adjust A8 so 10.7MC occurs at center of crossover lines as per Fig 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of cross over lines. Continue with step 8.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	Two 120Ω carbon res.	Across "FM Ant." terminals with 120Ω in each lead.	106MC (Unmod.)	FM	106MC	DC Probe to Point (A). Common to B-.	A13	Adjust for maximum deflection.
9.	"	"	90MC	"	90MC	"		Slightly bend the end plates of the FM RF section of tuning gang for maximum deflection.

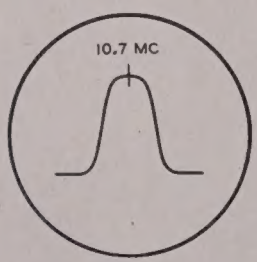


FIG. 1

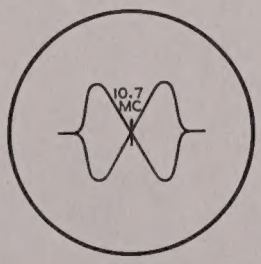


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	1st IF Amp.	6BA6	6BA6	7BK	
V4	2nd FM IF Amp.	6BA6	6BA6	7BK	
V5	Ratio Detector	6AL5	6AL5	6BT	
V6	DET.-AVC-AF	6SQ7	6SQ7	8Q	
V7	Power Output	25L6GT	25L6GT	7AC	
V8	Rectifier	25Z6GT	25Z6GT	7Q	

CAPACITORS

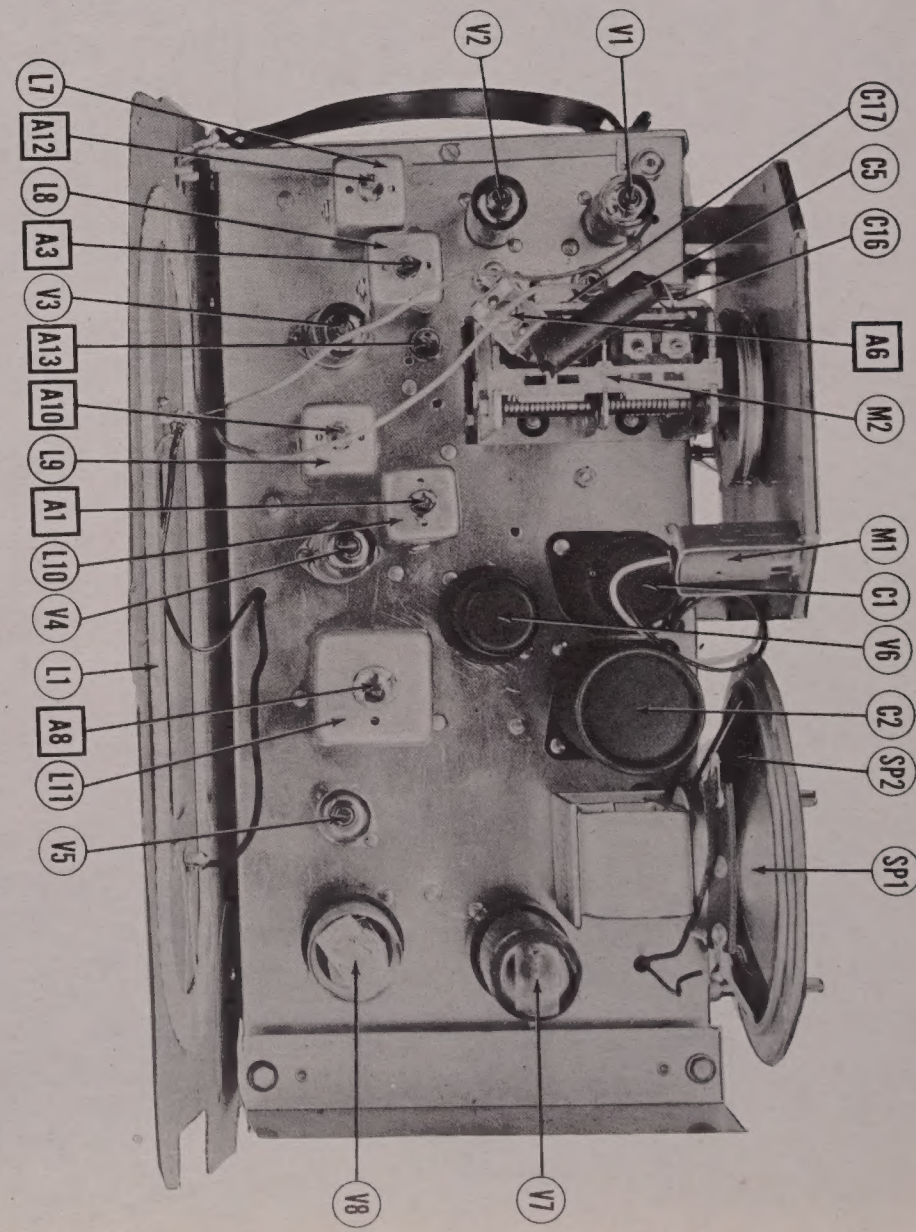
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	80	150	N-6312	AF20D		TVL-1	Filter
C2A	50	150	N-6313	AF101010D4A		EL-452	● Filter
B	50	150					■ Filter
C	50	150					▲ Filter
D	20	25				UT-41	Output Cathode Bypass
C3	6	150	N-1367	PRS150/4			Stabilizing Cap.
C4	.01	400	N-1344	P488-01	821-01	TM-11	Ant. Isolation
C5	.05	400	N-1345	P488-05		TM-15	Tuning Cap. Isolation
C6	.05	400	N-1345	P488-05		TM-15	AVC Filter
C7	20		N-6564	GP20K	NPOK-20	MS-42	Fixed Trimmer
C8	250		N-6488	GP250M	GP2K-250	1FM-325	Ant. Isolation
C9	5000		N-6272	BPD-5	811-005	29C1	AVC Filter
C10	5000		N-6272	BPD-5	811-005	29C1	RF Cathode Bypass
C11	5000		N-6272	BPD-5	811-005	29C1	RF Screen Bypass
C12	5000		N-6272	BPD-5	811-005	29C1	RF Filament Bypass
C13	50		N-6385	GP50K	GP1K-50	1FM-45	RF Coupling
C14	100		N-6015	GP100M	GP2K-100	1FM-31	RF Coupling
C15	75		N-6484	SI75JN750	N750L-75		Fixed Padder
C16	5000		N-6272	BPD-5	811-005	29C1	RF Bypass
C17	5000		N-6272	BPD-5	811-005	29C1	RF Bypass
C18	.1	200	N-1351	P288-1		TM-1	Line Isolation
C19	5000		N-6272	BPD-5	811-005	29C1	RF Bypass
C20	50		N-6385	GP50K	GP1K-50	1FM-45	Osc. Grid C ap.
C21	4.5		N-6483				Fixed Trimmer-See Note
C22	250		N-6488	GP250M	GP2K-250	1FM-325	Conv. Filament Bypass
C23	5000		N-6272	BPD-5	811-005	29C1	Osc. Anode Bypass
C24	5000		N-6272	BPD-5	811-005	29C1	Conv. Plate Decoupling
C25	5000		N-6272	BPD-5	811-005	29C1	AVC Filter
C26	.05	400	N-1346	P488-05		TM-15	AVC Filter
C27	5000		N-6272	BPD-5	811-005	29C1	1st IF Filament Bypass
C28	5000		N-6272	BPD-5	811-005	29C1	1st IF Cathode Bypass
C29	5000		N-6272	BPD-5	811-005	29C1	1st IF Decoupling
C30	50		N-6375	GP50M	GP1K-50	1FM-45	Diode RF Filter
C31	50		N-6375	GP50M	GP1K-50	1FM-45	Diode RF Filter
C32	10000		N-6482	GP10000M	821-01	36C1	RF Bypass
C33	5000		N-6272	BPD-5	811-005	29C1	AVC Filter
C34	5000		N-6272	BPD-5	811-005	29C1	2nd IF Cathode Bypass
C35	5000		N-6272	BPD-5	811-005	29C1	2nd IF Decoupling
C36	130		N-6487	GP120K	GP2K-120	1FM-315	Diode Load Cap.
C37	.002	600	N-6377	P688-002	GP2M-002	TM-22	De-emphasis
C38	5000		N-6272	BPD-5	811-005	29C1	RF Bypass
C39	5000		N-6272	BPD-5	811-005	29C1	Ratio Det. Filament Bypass
C40	250		N-6488	GP250M	GP2K-250	1FM-325	RF Bypass
C41	10000		N-6482	GP10000M	821-01	36C1	RF Bypass
C42	.02	400	N-1376	P488-02		TM-12	Audio Coupling
C43	.01	400	N-1344	P488-01	821-01	TM-11	Tone Compensation
C44	.006	600	N-4894	P688-006	GP2M-0056	TM-26	Audio Coupling
C45	.1	200	N-1351	P288-1		TM-1	RF Bypass
C46	250		N-6488	GP250M	GP2K-250	1FM-325	RF Bypass
C47	250		N-6488	GP250M	GP2K-250	1FM-325	AF Amp. Plate Bypass
C48	.01	400	N-1344	P488-01	821-01	TM-11	Audio Coupling
C49	.005	600	N-4894	P688-005	811-005	TM-25	Tone Compensation
C50	.1	200	N-1351	P288-1		TM-1	AF Amp. Plate Decoupling
C51	.01	400	N-1344	P488-01	821-01	TM-11	Output Plate Bypass
C52	5000		N-6272	BPD-5	811-005	29C1	RF Bypass
C53	.05	400	N-1346	P488-05		TM-15	Line Filter
C54	4.5			SI4.5CN750	N750K-5		Osc. Feedback - See Note

Note. Not used in all models.

SET 91 FOLDER 1

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA AIRCASTLE PART No.	REPLACEMENT DATA IRC PART No.	REPLACEMENT DATA CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	N6274	Q13-133X	AT-78	Volume control, tapped at 100KΩ
B	Shaft		Not Req.	Not Req.	K58-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2	500KΩ	½	N6273			Tone control

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA AIRCASTLE PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
R3	68Ω	½	N-6485		RF Cathode
R4	2200Ω	½	N-4696	BTS-2200	RF Screen
R5	820Ω	½	N-4279	BTS-820	RF Plate
R6	2. 2 Meg.	½	N-4277	BTS-2.2 Meg.	AVC Network
R7	220KΩ	½	N-4026	BTS-220K	AVC Network
R8	1 Meg.	½	N-1262	BTS-1 Meg.	AVC Network
R9	10KΩ	½	N-4695	BTS-10K	Conv. Grid
R10	22KΩ	½	N-4025	BTS-22K	Osc. Grid
R11	12Ω	1	N-5053		Parasitic Supp.
R12	1000Ω	½	N-1594	BTS-1000	Osc. Anode
R13	1000Ω	½	N-1594	BTS-1000	Conv. Plate Decoupling
R14	68Ω	½	N-6485		1st IF Cathode
R15	470Ω	½	N-6011	BTS-470	1st IF Decoupling
R16	47KΩ	½	N-4063	BTS-47K	Diode Filter
R17	220KΩ	½	N-4026	BTS-220K	AVC Network
R18	68Ω	½	N-6485		FM 2nd IF Cathode
R19	470Ω	½	N-6011	BTS-470	FM 2nd IF Decoupling
R20	68Ω	½	N-6485		Balancing
R21	33KΩ	½	N-4064	BTS-33K	De-emphasis
R22	100KΩ	½	N-2973	BTS-100K	AVC Network
R23	33KΩ	½	N-4064	BTS-33K	Ratio Det. Diode Load
R24	1.8 Meg.	½	N-6456	BTS-1.8 Meg.	AVC Network-See Note
R25	27KΩ	½	N-4451	BTS-27K	Tone Compensation
R26	6.8 Meg.	½	N-4028	BTS-6.8 Meg.	AF Amp. Grid
R27	220KΩ	½	N-4026	BTS-220K	AF Amp. Plate
R28	68KΩ	½	N-5693	BTS-68K	AF Amp. Decoupling
R29	470KΩ	½	N-4027	BTS-470K	Output Grid
R30	150Ω	½	N-3863	BW-½-150	Output Cathode
R31	150Ω	½	N-3863	BW-½-150	Filter
R32	100Ω	½	N-1615	BW-½-100	Filter-Wire Wound
R33	68Ω	1	N-5379	BW-1-68	Filter
R34	12Ω	1	N-5053		Surge Limiter
R35	250Ω	½	N-6311		Voltage Regulating-Temp. Comp.
R36A	100Ω	7.7	N-6352		Filament Dropping-Wire Wound
B	60Ω	8			Filament Dropping-Wire Wound

Note. Some models use two resistors in parallel to obtain required resistance and wattage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA AIRCASTLE PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	INSTALLATION NOTES
T1	2.5KΩ	3.2Ω	225Ω Tap ④ 2.6Ω	.5Ω	N-6369	A-3330 ③	A-3031 ③	RO-3 ③	③ Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA AIRCASTLE PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-105 ①		① Fabricate new mounting bracket.
SP1	PM	3.2Ω	N-6286	MOD. P5-X	5A07 ②	② Use mounting bracket provided.
	CONE DIA.	V. C. DIA.				
SP2	4 1/2"	9/16"				

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

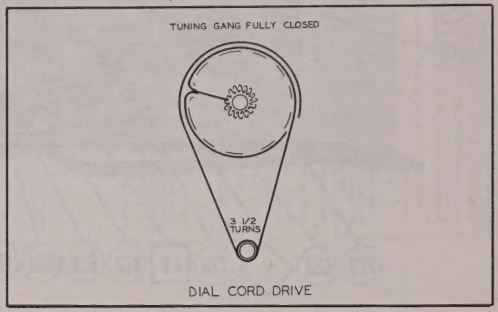
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA AIRCASTLE PART No.	REPLACEMENT DATA MEISSNER PART No.
L1	Loop Ant.	.5Ω	2.5Ω	N-6343	
L2	FM Ant.	0Ω	0Ω	N-6371	
L3	RF Plate Choke	0Ω		N-6373	
L4	FM RF	0Ω		N-6372	
L5	FM Osc.	0Ω		N-6349	
L6	AM Osc.	2Ω	4.5Ω	N-6348	14-1073
L7	1st FM IF	1.5Ω	0Ω	N-6346	
L8	1st AM IF	14Ω	14Ω	N-6344	16-6678
L9	2nd FM IF	1.5Ω	0Ω	N-6346	
L10	2nd AM IF	12.5Ω	12.5Ω	N-6345	16-6678
L11	Ratio Det. Trans.	1Ω	.1Ω	N-6341	
L12	Fil. Choke	.5Ω	.5Ω	N-6389	
L13	RF Grid Choke	0Ω			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA AIRCASTLE PART No.	NOTES
M1	Bayonet	6-8	.15	Brown	N-1147	Type #47

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
M2	2 Gang Var. Cap.	N-6276	(13-473MMF, 9-196MMF)
M3	Switch	N-6351	AM-FM
A5	Trimmer	N-6407	BC Osc. Adj.
A6	Trimmer	N-6406	BC Ant. Adj.
A13	Trimmer	N-6420	FM Osc. Adj.



PHOTOFACT* Folder

AIR KING MODEL A1016

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AIR KING MODEL A1016

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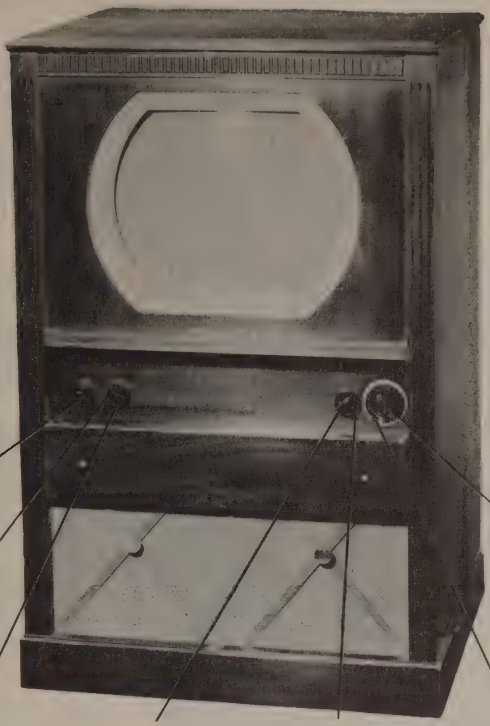

AIR KING
MODEL A1016

TRADE NAME	Air King, Model A1016
MANUFACTURER	Air King Products Co., 170 53rd St., Brooklyn, New York
TYPE SET	Television Receiver
TUBES	Thirty
POWER SUPPLY	110-120 Volts AC
RATING	2.5 Amp. at 117 Volts AC
TUNING RANGE—Channels 2 thru 13	

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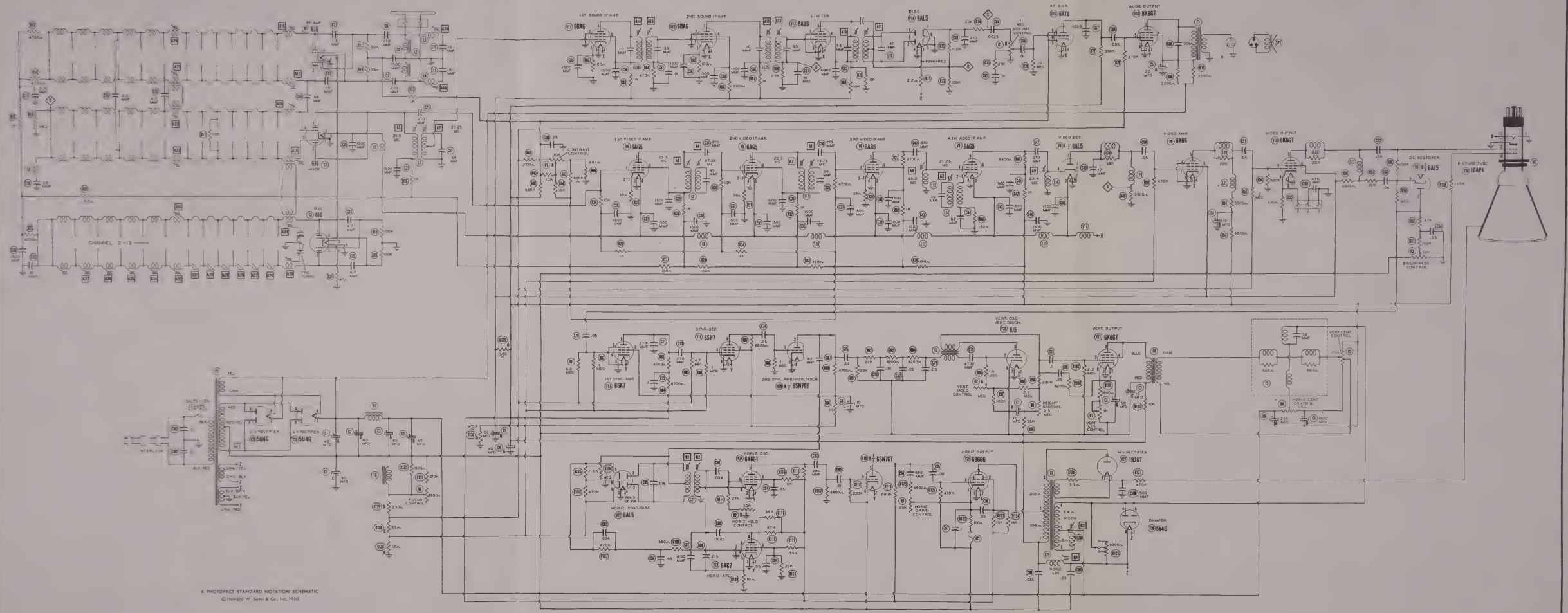
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MODEL A1016
91-2
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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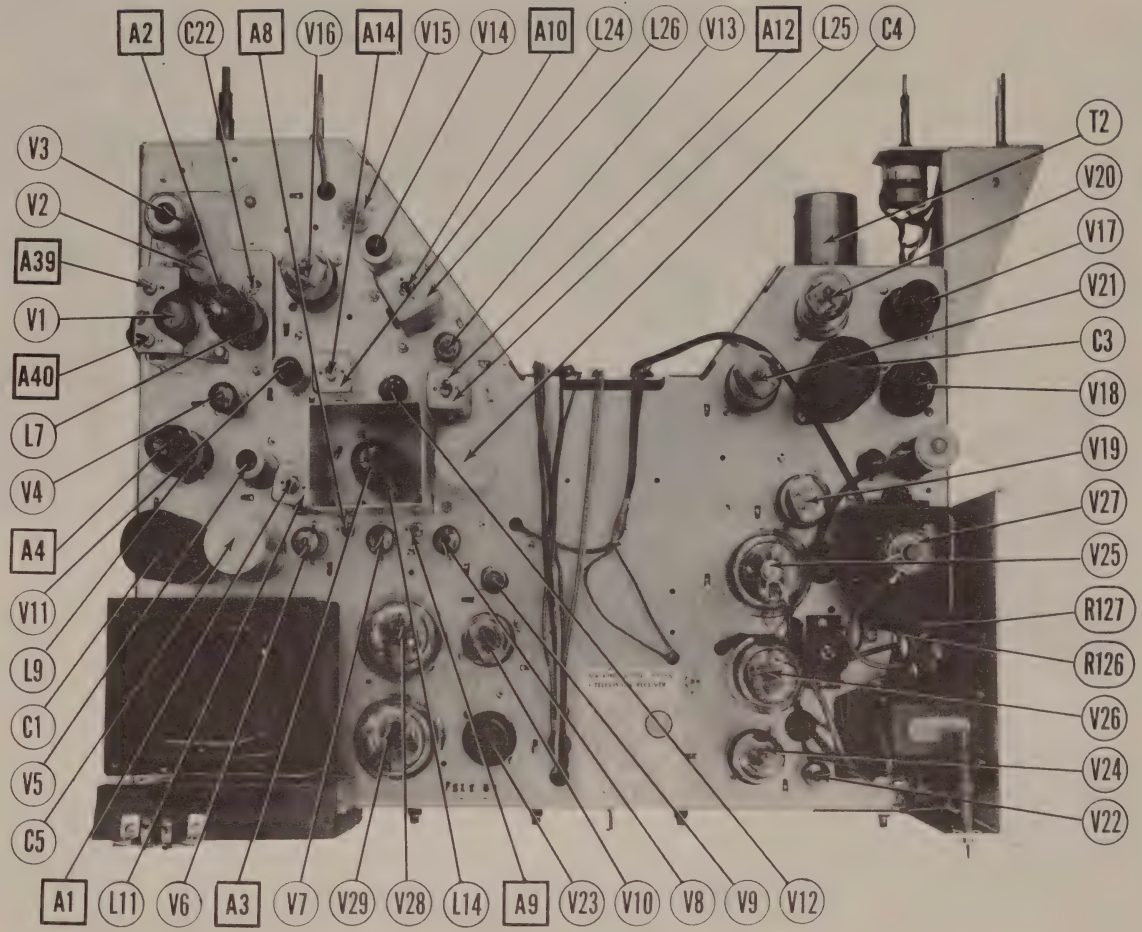
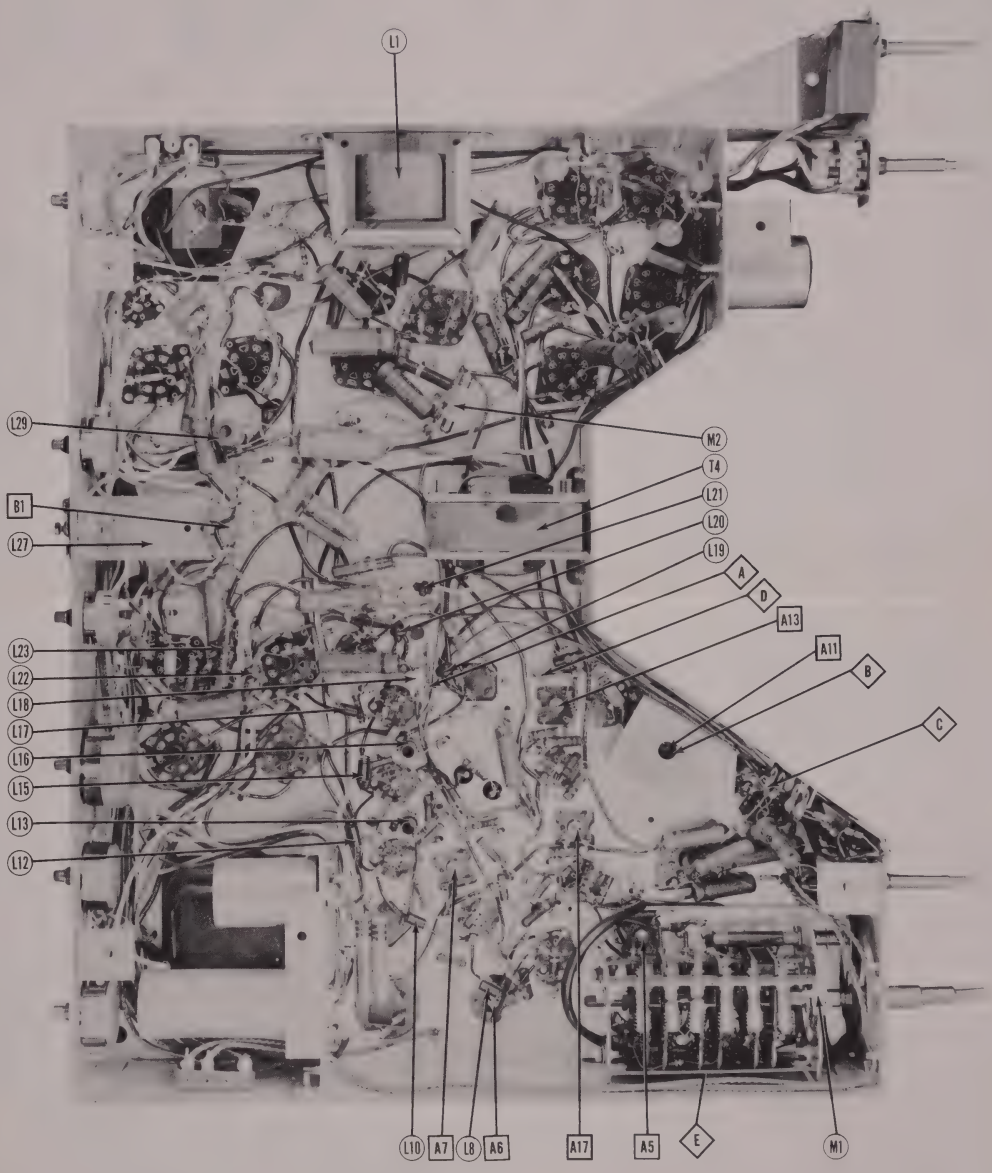
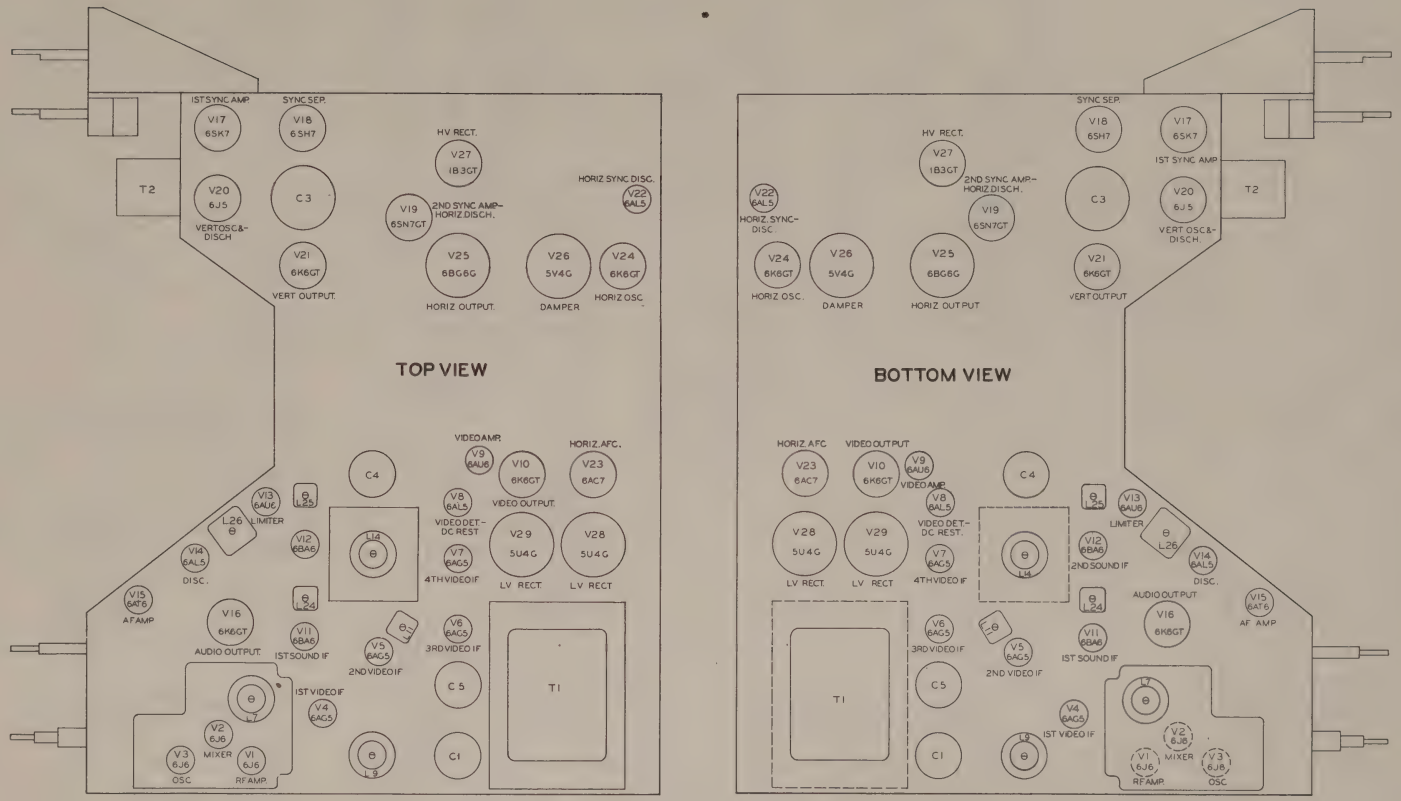


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If alignment is performed with picture tube removed, remove V22 from its socket to disable the high voltage supply.
The oscillator tube (V3) should be removed when performing IF adjustments. Use insulated alignment screwdriver for adjusting.
Set contrast control to give a -3 volt reading on VTVM connected between the junction of R43 and R44 and chassis. Leave at this setting during entire IF alignment procedure.

VIDEO IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	19.75MC	9	DC Probe to Point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	Direct	"	21.25MC	9	"	A2, A3	"
3.	Direct	"	27.25MC	9	"	A4	"
4.	Direct	"	21.8MC	9	"	A5	Adjust for maximum deflection.
5.	Direct	"	25.3MC	9	"	A6	"
6.	Direct	"	22.3MC	9	"	A7	"
7.	Direct	"	25.2MC	9	"	A8	"
8.	Direct	"	23.4MC	9	"	A9	Adjust for maximum deflection. If A7 required adjustment in step 6 repeat step 2. If FM signal generator is not available continue with step 10.

OVERALL VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the signal generator to the horizontal amplifier in the scope for horizontal deflection.
The waveforms shown may be inverted depending on the number of amplifying stages in the vertical amplifier in the scope being used.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	5000MMF	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC SWP)	See Fig. 4	9	Vert. Amp. to Point (A). Low side to chassis.	A5, A6, A7, A8, A9	Make slight adjustments if necessary to obtain response curve per Fig 4. If considerable adjustment is required the traps must be realigned.

SOUND IF ALIGNMENT USING VTVM

Do not remove the shield covering the discriminator tube socket during step 10. Fashion hook on 1 Megohm resistor and make connection to Point B through alignment hole in shield.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	5000MMF	High side to pin 1 of 3rd Sound IF (V13). Low side to chassis.	21.25MC	9	DC Probe to Point (B) in series with 1 Meg. Common to chassis.	A10	Detune A11. Adjust A10 for maximum deflection.
11.	5000MMF	"	"	9	DC Probe to Point (C). Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
12.	5000MMF	High side to pin 1 of 2nd Sound IF (V12). Low side to chassis.	"	9	DC Probe to Point (D). Common to chassis.	A12, A13	Adjust for maximum deflection.
13.	5000MMF	High side to tap on trap winding of L7. Low side to chassis.	"	9	"	A14, A15	"

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	5000MMF	High side to pin 1 of 3rd Sound IF (V13). Low side to chassis.	21.25MC (600KC SWP)	21.25MC	9	Vert. Amp. to Point (C). Low side to chassis.	A10, A11	Adjust for maximum amplitude of peaks and straightness of diagonal line with marker at center of line as per Fig. 1.
11.	5000MMF	High side to pin 1 of 2nd Sound IF (V12). Low side to chassis.	"	"	9	Vert. Amp. to Point (D) in series with 33KΩ. Low side to chassis.	A12, A13	Adjust for maximum amplitude and symmetry aper Fig 2.
12.	5000MMF	High side to tap on trap winding of L7. Low side to chassis.	"	"	9	"	A14, A15	Adjust for maximum amplitude and symmetry as per Fig 3. Continue with step 14.

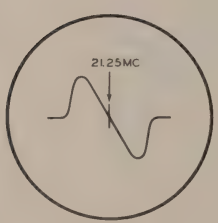


FIG.1

FIG.2

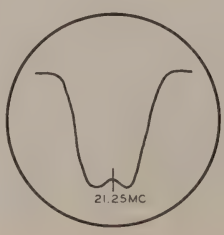


FIG.3

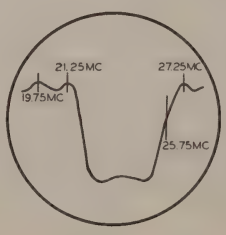


FIG.4

ALIGNMENT INSTRUCTIONS (CONT.)

RF AND MIXER LINE ALIGNMENT

On those models having the RF Grid returned to the contrast control it is necessary to set the bias at -1.5 volts. Connect DC probe of VTVM to pin 5 or 6 of 1st AF Tube (V15), common to chassis and set contrast control for reading of -1.5 volts.
The signal generator output should be terminated with a resistance equal to its output impedance (usually 50 ohms).
These adjustments are usually very stable and alignment should not be attempted unless they are known to be out of alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	120Ω carbon res. in series with each lead.	To antenna terminals.	177MC (10MC SWP)	175.25MC 179.75MC	7	Vert. Amp. to Point (E) in series with 10KΩ. Ground to chassis.	A16, A17, A18, A19	Adjust for approximately flat top response per Fig 5 with markers above 70%.
15.	"	"	183MC (10MC SWP)	181.25MC 185.75MC	8	"		Check for response curve per Fig 5.
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			207MC (10MC SWP)	205.25MC 209.75MC	12			
			213MC (10MC SWP)	211.25MC 215.75MC	13			

If markers are below 70% on any channel make slight adjustment of A16, A17, A18 and A19 with channels selector on that channel. Recheck the other high band channels to see that they have not been seriously effected.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	120Ω carbon res. in series with each lead.	To antenna terminals.	85MC (10MC SWP)	83.25MC 87.75MC	6	Vert. Amp. to Point (E) in series with 10KΩ. Ground to chassis.	A20, A21, A22, A23	Adjust for approximately flat top response per Fig 5 with markers above 70%.
17.	"	"	79MC (10MC SWP)	77.25MC 81.75MC	5	"		Check for response curve per Fig 5.
			69MC (10MC SWP)	67.25MC 71.75MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

If markers are below 70% on any channel make slight adjustments of A20, A21, A22 and A23 with channel selector on that channel. Recheck the other low band channels to see that they have not been seriously effected.

OSCILLATOR ALIGNMENT

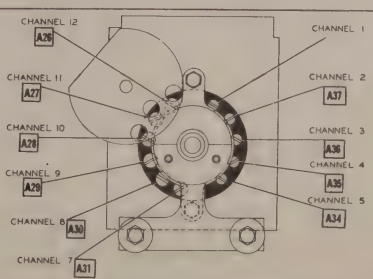
Replace oscillator tube (V3).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
18.	Two 120Ω carbon res.	To antenna terminals.	215.75MC	13	DC Probe to Point (C) Common to chassis.	A24, A25	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Keep A24 and A25 slugs at approximately the same relative position.
19.	"	"	209.75MC	12	"	A26	Adjust for zero reading as above.
			203.75MC	11		A27	
			197.75MC	10		A28	
			191.75MC	9		A29	
			185.75MC	8		A30	
			179.75MC	7		A31	
20.	"	"	87.75MC	6	"	A32, A33	Adjust for zero reading keeping A32 and A33 slugs at approximately the same relative position.
21.	"	"	81.75MC	5	"	A34	Adjust for zero reading.
			71.75MC	4		A35	
			65.75MC	3		A36	
			59.75MC	2		A37	

WAVE TRAP ADJUSTMENT

Wave traps A39 and A40 are used for specific types of interference and their alignment will depend upon the type encountered. With the receiver tuned to the channel having the interference set fine tuning control until interference is at maximum. Adjust A39 and A40 for minimum interference in the picture and sound, keeping the cores at approximately the same relative position. Turn one core 1/2 turn, adjust the other for minimum interference.

FIG.5



RF OSCILLATOR ALIGNMENT POINTS

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	50VDC	50VDC	6.3VAC	0V.	-.2VDC	-.2VDC	0V.		
V 2	6J6	95VDC	95VDC	6.3VAC	0V.	-2VDC	-3.1VDC	0V.		
V 3	6J6	55VDC	55VDC	6.3VAC	0V.	§-5.5VDC	§-5.4VDC	.2VDC		
V 4	6AG5	-.8VDC	.2VDC	0V.	6.3VAC	95VDC	95VDC	.2VDC		
V 5	6AG5	-.8VDC	.3VDC	6.3VAC	0V.	95VDC	95VDC	.3VDC		
V 6	6AG5	-.8VDC	.2VDC	6.3VAC	0V.	95VDC	105VDC	.2VDC		
V 7	6AG5	0V.	1.5VDC	6.3VAC	0V.	65VDC	110VDC	1.5VDC		
V 8	6AL5	0V.	-87VDC	6.3VAC	0V.	-72VDC	0V.	-6.2VDC		
V 9	6AU6	-.7VDC	0V.	0V.	6.3VAC	250VDC	115VDC	0V.		
V 10	6K6GT	0V.	0V.	85VDC	115VDC	-2.3VDC	0V.	6.3VAC	3.8VDC	
V 11	6BA6	0V.	0V.	0V.	6.3VAC	103VDC	103VDC	1.3VDC		
V 12	6BA6	0V.	0V.	6.3VAC	0V.	107VDC	105VDC	1.1VDC		
V 13	6AU6	-.3VDC	0V.	0V.	6.3VAC	42VDC	42VDC	0V.		
V 14	6AL5	0V.	-.2VDC	5.1VAC	0V.	0V.	0V.	-.6VDC		
V 15	6AT6	-.4VDC	0V.	0V.	6.3VAC	.1VDC	.1VDC	80VDC		
V 16	6K6GT	0V.	6.3VAC	245VDC	255VDC	-8.9VDC	0V.	0V.	0V.	
V 17	6SK7	0V.	0V.	0V.	-.8VDC	0V.	107VDC	6.3VAC	205VDC	
V 18	6SH7	0V.	0V.	0V.	-1.9VDC	0V.	117VDC	6.3VAC	115VDC	
V 19	6SN7GT	-1.6VDC	75VDC	0V.	¶-31VDC	¶25VDC	¶0V.	6.3VAC	0V.	
V 20	6J5	0V.	0V.	¶90VDC ¶360VDC	¶0V.	¶-92VDC	¶-20VDC	6.3VAC	¶0V.	
V 21	6K6GT	0V.	6.3VAC	¶265VDC	¶265VDC	¶0V.	¶0V. ¶38VDC	0V.	¶22VDC ¶48VDC	
V 22	6AL5	-1.3VDC	-5.5VDC	0V.	5.1VAC	-2.3VDC	0V.	-5.3VDC		
V 23	6AC7	0V.	0V.	0V.	-1.2VDC	0V.	100VDC	6.3VAC	280VDC	
V 24	6K6GT	0V.	0V.	175VDC	195VDC	-25VDC	350VDC	6.3VAC	.2VDC	
V 25	6BG6G	0V.	6.3VAC	¶10VDC	0V.	¶0V.	0V.	0V.	¶280VDC	TOP CAP *
V 26	5V4G	0V.	360VDC	0V.	280VDC	0V.	280VDC	0V.	360VDC	
V 27	1B3GT	* DO NOT MEASURE.								
V 28	5U4G	0V.	300VDC	0V.	350VAC	0V.	350VAC	0V.	300VDC	
V 29	5U4G	0V.	300VDC	0V.	350VAC	0V.	350VAC	0V.	300VDC	
V 30	16AP4	0V.	-70VDC	PIN 10 275VDC	PIN 11 0V.	PIN 12 6.3VAC				

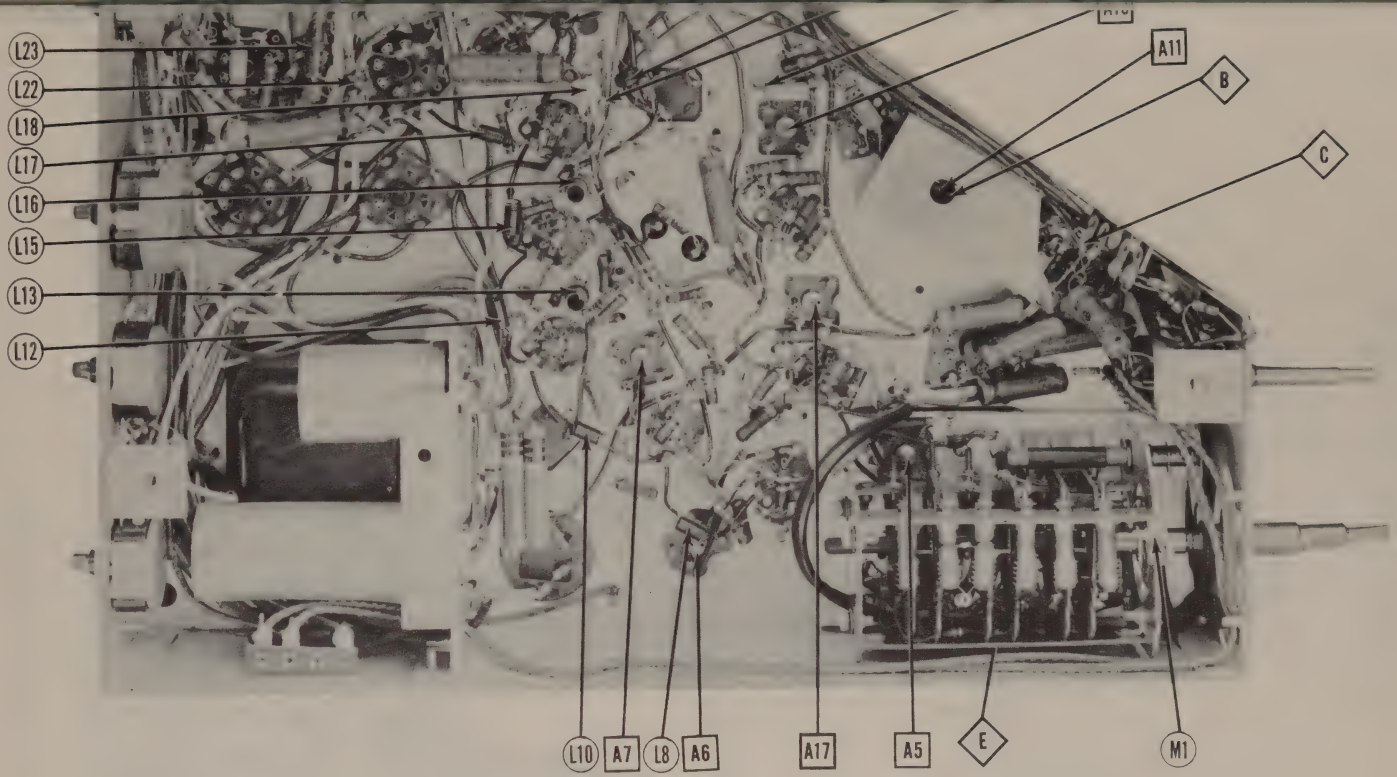
§ TAKEN WITH VACUUM TUBE VOLTMETER.
* DO NOT MEASURE.
¶ MEASURED FROM PIN 8 OF V20.
NOTE: CONTRAST CONTROL SET AT MAXIMUM FOR THESE MEASUREMENTS.

RESISTANCE READINGS

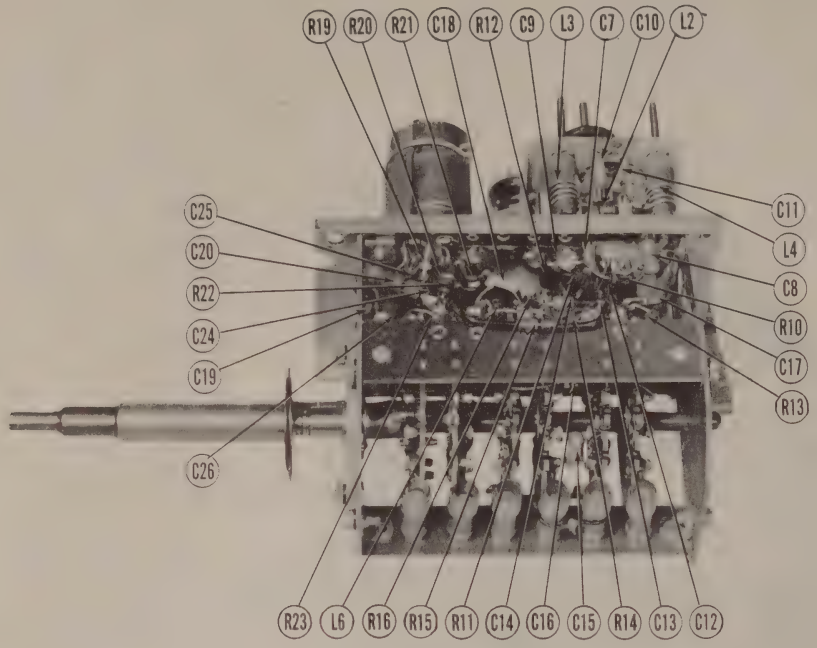
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†6KΩ	†6KΩ	.1Ω	0Ω	12KΩ	12KΩ	0Ω		
V 2	6J6	†3KΩ	†3KΩ	.1Ω	0Ω	1 Meg.	1 Meg.	0Ω		
V 3	6J6	†6.8KΩ	†6.8KΩ	.1Ω	0Ω	100KΩ	100KΩ	47Ω		
V 4	6AG5	20KΩ	39Ω	0Ω	.1Ω	†3KΩ	†3KΩ	39Ω		
V 5	6AG5	20KΩ	39Ω	.1Ω	0Ω	†3KΩ	†3KΩ	39Ω		
V 6	6AG5	12KΩ	39Ω	.1Ω	0Ω	†5KΩ	†2.5KΩ	39Ω		
V 7	6AG5	.2Ω	150Ω	.1Ω	0Ω	†7.5KΩ	†2.5KΩ	150Ω		
V 8	6AL5	.2Ω	200KΩ	.1Ω	0Ω	1.2 Meg.	0Ω	3.9KΩ		
V 9	6AU6	470KΩ	0Ω	0Ω	.1Ω	†10KΩ	†1.4KΩ	0Ω		
V 10	6K6GT	0Ω	0Ω	†4.5KΩ	†1.4KΩ	500KΩ	Inf.	.1Ω	330Ω	
V 11	6BA6	.1Ω	0Ω	0Ω	.1Ω	†2.5KΩ	†2.5KΩ	100Ω		
V 12	6BA6	470KΩ	0Ω	.1Ω	0Ω	†2.5KΩ	†4.8KΩ	100Ω		
V 13	6AU6	22KΩ	0Ω	0Ω	.1Ω	†8KΩ	†8KΩ	0Ω		
V 14	6AL5	200KΩ	100KΩ	1Ω	0Ω	0Ω	0Ω	100KΩ		
V 15	6AT6	10 Meg.	0Ω	0Ω	.1Ω	10KΩ	10KΩ	†330KΩ		
V 16	6K6GT	Inf.	.1Ω	†1.5KΩ	†1000Ω	270KΩ	200KΩ	0Ω	0Ω	
V 17	6SK7	0Ω	0Ω	0Ω	900KΩ	0Ω	†2.5KΩ	.1Ω	†9.5KΩ	
V 18	6SH7	0Ω	0Ω	0Ω	800KΩ	0Ω	†1.4KΩ	.1Ω	†8KΩ	
V 19	6SN7GT	1 Meg.	†9KΩ	0Ω	220KΩ	†680KΩ	450Ω	.1Ω	0Ω	
V 20	6J5	0Ω	0Ω	†1.5Meg. †220KΩ	65KΩ	2.5Meg.	1 Meg.	.1Ω	450Ω	
V 21	6K6GT	Inf.	.1Ω	†10KΩ	†10KΩ	2.2 Meg.	5.5KΩ 450Ω	0Ω	7.2KΩ 2.2KΩ	
V 22	6AL5	1 Meg.	1.5Meg.	0Ω	1Ω	12Ω	0Ω	1.5 Meg.		
V 23	6AC7	0Ω	0Ω	0Ω	1.5 Meg.	10Ω	†19KΩ	.1Ω	†23KΩ	
V 24	6K6GT	Inf.	0Ω	†5KΩ	†10KΩ	77KΩ	†9KΩ	.1Ω	10Ω	
V 25	6BG6G	Inf,	.1Ω	550Ω	Inf.	470KΩ	Inf.	0Ω	†9.5KΩ	TOP CAP †9.5KΩ
V 26	5V4G	Inf.	†9.5KΩ	Inf.	†60Ω	Inf.	†60Ω	Inf.	†9.5KΩ	
V 27	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP †10KΩ
V 28	5U4G	Inf.	6KΩ	Inf.	460Ω	Inf.	460Ω	Inf.	6KΩ	
V 29	5U4G	Inf.	6KΩ	Inf.	460Ω	Inf.	460Ω	Inf.	6KΩ	
V 30	16AP4	0Ω	1.3 Meg.	PIN 10 †150KΩ	PIN 11 0Ω	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V28.

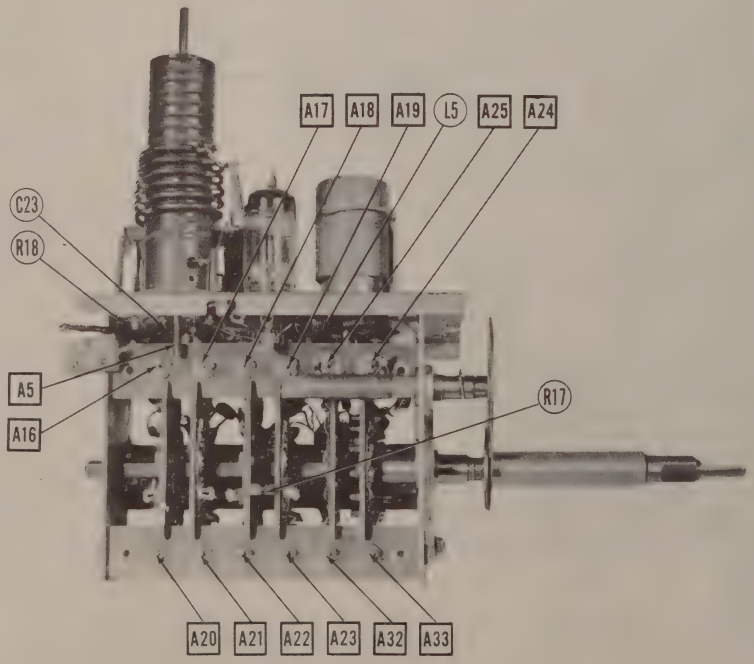
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



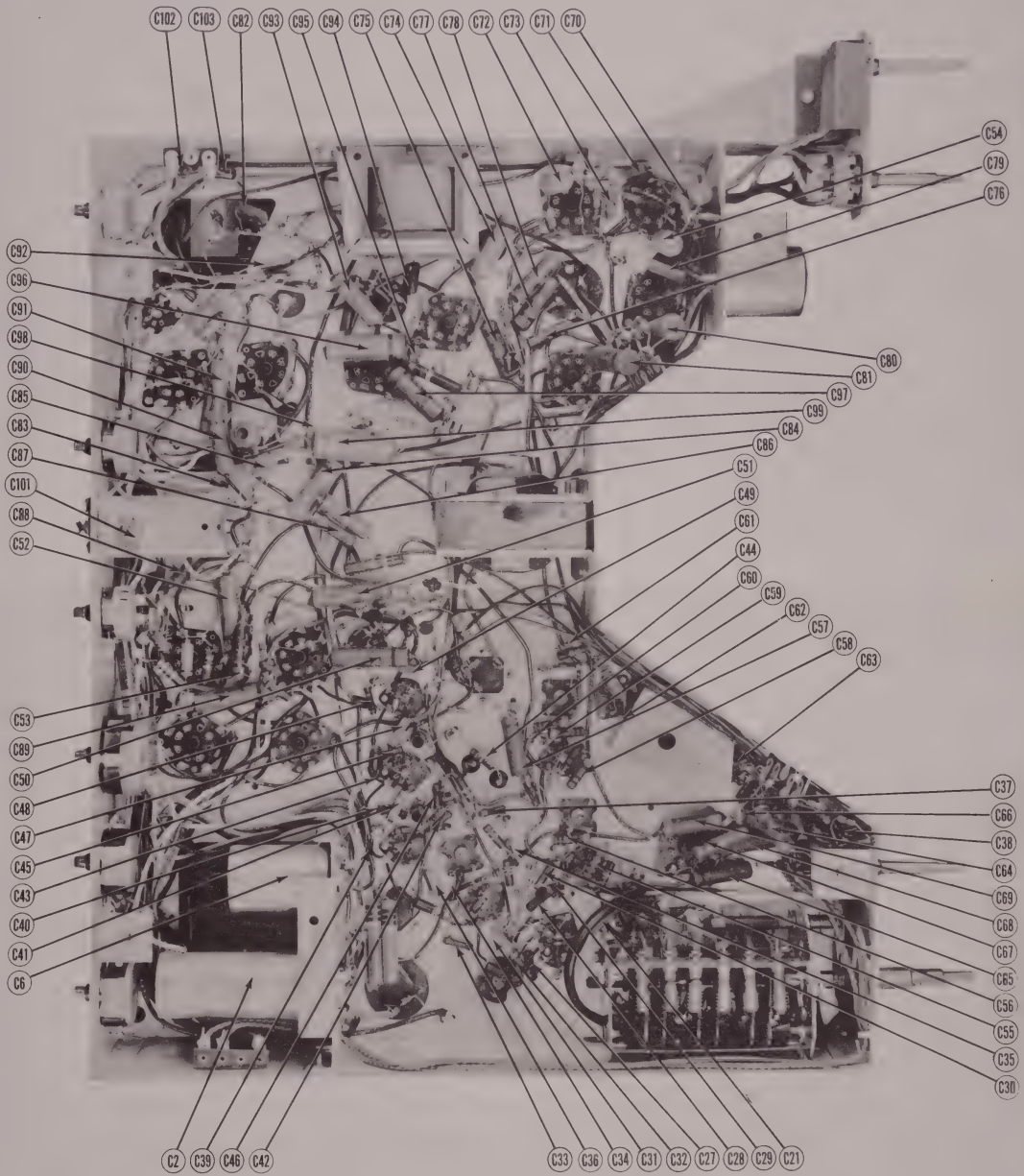
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



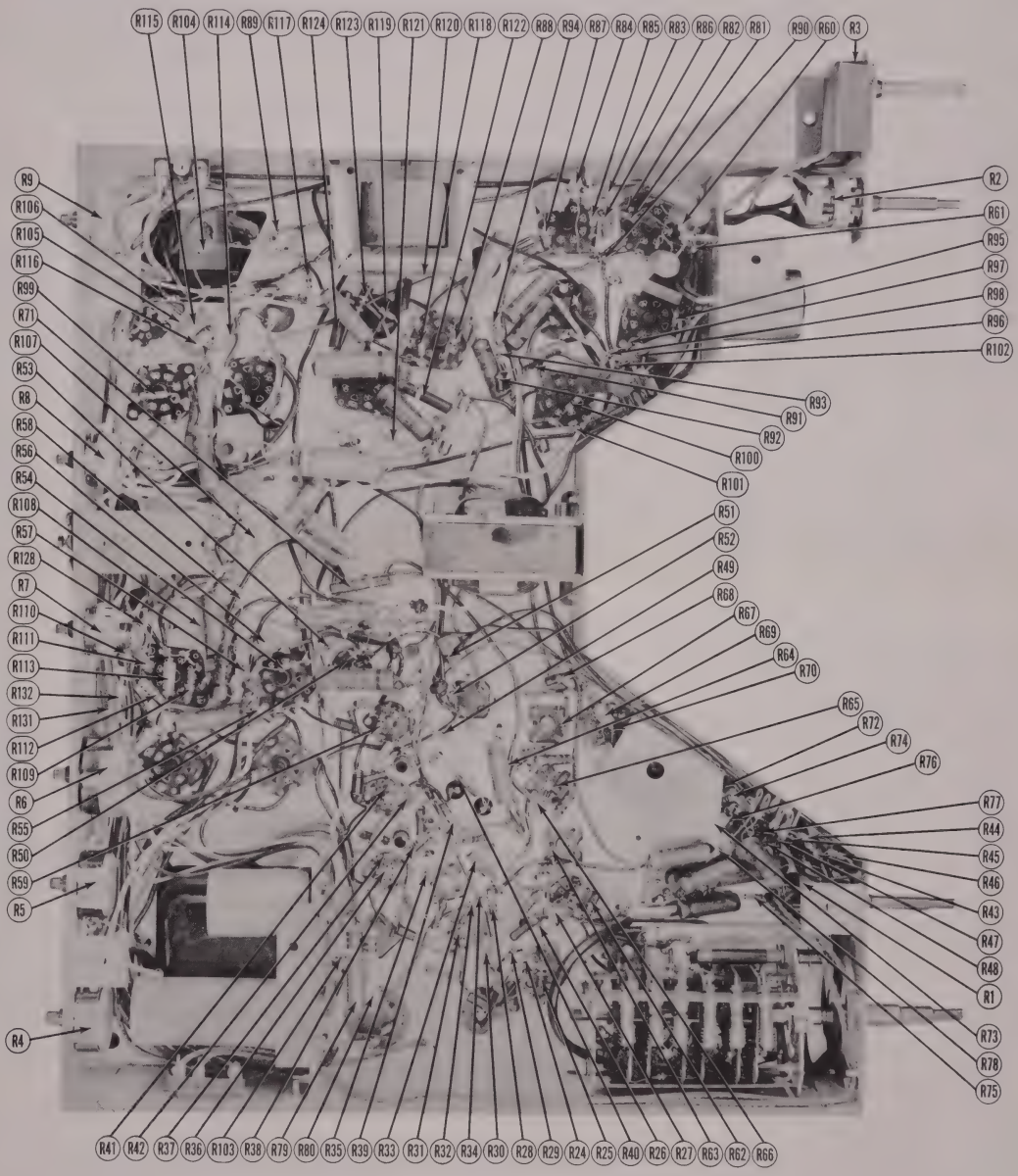
RF TUNER-RIGHT SIDE



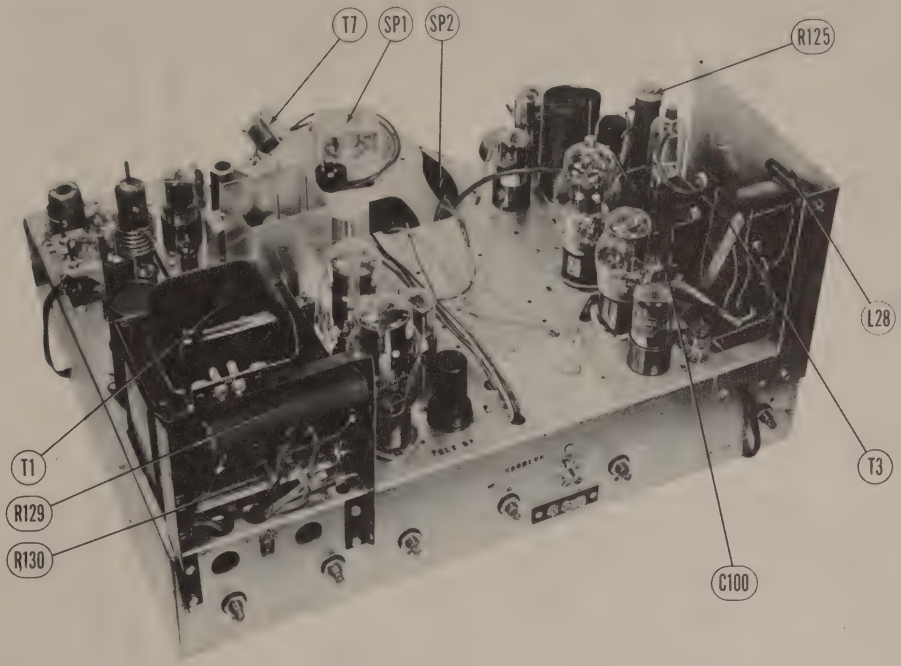
RF TUNER-LEFT SIDE



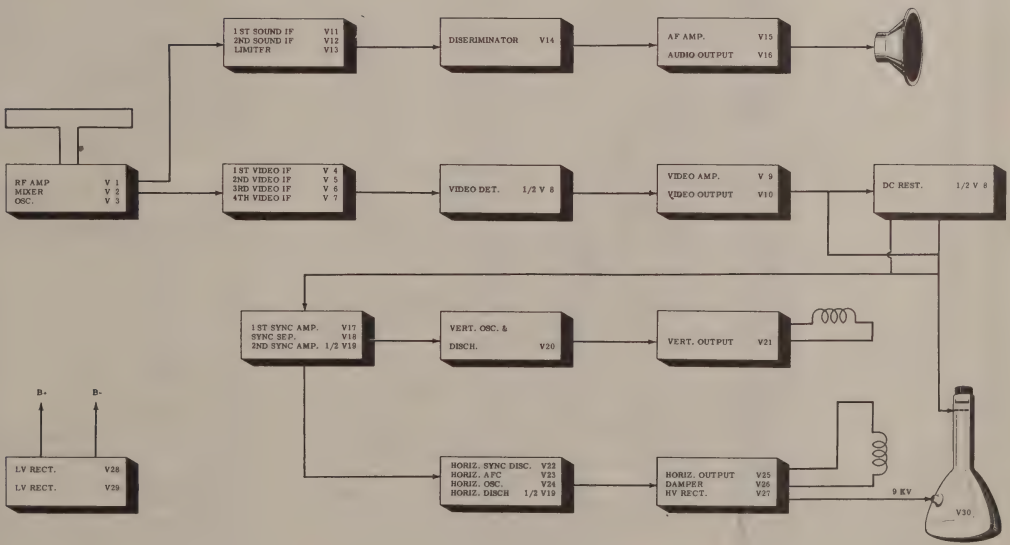
CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS-TOP VIEW



BLOCK DIAGRAM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6J6	6J6	7BF
V2	Mixer		6J6	6J6	7BF
V3	Oscillator		6J6	6J6	7BF
V4	1st Video IF		6AG5	6AG5	7BD
V5	2nd Video IF		6AG5	6AG5	7BD
V6	3rd Video IF		6AG5	6AG5	7BD
V7	4th Video IF		6AG5	6AG5	7BD
V8	Video Det. -DC Restorer		6AL5	6AL5	6BT
V9	Video Amp.		6AU6	6AU6	7BK
V10	Video Output		6K6GT	6K6GT	7S
V11	1st Sound IF		6BA6	6BA6	7BK
V12	2nd Sound IF		6BA6	6BA6	7BK
V13	Limiter		6AU6	6AU6	7BK
V14	Discriminator		6AL5	6AL5	6BT
V15	AF Amp.		6AT6	6AT6	7BT
V16	Audio Output		6K6GT	6K6GT	7S
V17	1st Sync. Amp.		6SK7	6SK7	8N
V18	Sync. Sep.		6SH7	6SH7	8BK
V19	2nd Sync. Amp. - Hor. Disch.		6SN7GT	6SN7GT	8BD
V20	Vert. Osc. - Disch.		6J5	6J5	6Q
V21	Vert. Output		6K6GT	6K6GT	7S
V22	Hor. Sync. Disc.		6AL5	6AL5	6BT
V23	Hor. AFC		6AC7	6AC7	8N
V24	Hor. Osc.		6K6GT	6K6GT	7S
V25	Hor. Output		6BG6G	6BG6G	5BT
V26	Damper		5V4G	5V4G	5L
V27	HV Rectifier		1B3GT	1B3GT	3C
V28	LV Rectifier		5U4G	5U4G	5T
V29	LV Rectifier		5U4G	5U4G	5T
V30	Picture Tube		16AP4	16AP4	12D

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AFH82J16E		TVL-25	▲ Filter
B	10	450					■ Decoupling
C	80	150					▲ Filter
C2A	40	450		AFH882J		TVL-30	▲ Filter
B	40	450					■ Filter
C	10	450					▲ Vert. Output Decoupling
C3A	80	450		AFH16J10B		TVL-18	▲ Filter
B	50	50					▲ Vert. Output Cathode Bypass
C4A	40	450		AF82J2H		TVL-53	▲ Filter
B	10	450					■ Low Pass Filter
C	10	350					▲ Decoupling
C5A	20	450		AFH4J16H		TVL-16	▲ Output Decoupling
B	80	350					▲ Filter
C6A	250	10		PRS10/250		TVL-66	▲ Horiz. Centering Control Bypass
B	1000	6		PRS6/1000			▲ Vert. Centering Control Bypass
C7	270			GP270M	GP2K-270		RF Coupling
C8	270			GP270M	GP2K-270		RF Coupling
C9	1500			GP1500M	GP2L-0015		Bias Filter
C10	10			CN10DNPO	NPOK-10		Fixed Trimmer
C11	10			CN10DNPO	NPOK-10		Fixed Trimmer
C12	1.5				NPOK-1.5		Neutralizing
C13	1.5				NPOK-1.5		Neutralizing
C14	.68						RF Coupling
C15	4.7			CN4.7DNPO	NPOK-4.7		RF Coupling
C16	2.2						RF Coupling
C17	1500			GP1500M	GP2L-0015		RF Decoupling
C18	22			GP22K	GP1K-22		Fixed Trimmer
C19	10			CN10DNPO	NPOK-10		Osc. Plate Decoupling
C20	1500			GP1500M	GP2L-0015		Decoupling
C21	270	500			GP2K-270		IF Coupling
C22	68			CN68JNPO	NPOM-68		Fixed Trimmer
C23	1500			GP1500M	GP2L-0015		Mixer Plate Decoupling
C24	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C25	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C26	1500			GP1500M	GP2L-0015		Mixer Filament Bypass
C27	1500			GP1500M	GP2L-0015	1FM-215	1st Video IF Filament Bypass
C28	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C29	1500			GP1500M	GP2L-0015	1FM-215	1st Video IF Decoupling
C30	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C31	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C32	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C33	1500			GP1500M	GP2L-0015	1FM-215	2nd Video IF Filament Bypass
C34	1500			GP1500M	GP2L-0015	1FM-215	2nd Video IF Decoupling
C35	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C36	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C37	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C38	.25	400		P488-25		TC-2	Bias Filter
C39	1500			GP1500M	GP2L-0015	1FM-215	3rd Video IF Filament Bypass
C40	1500			GP1500M	GP2L-0015	1FM-215	3rd Video IF Decoupling
C41	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C42	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C43	1500			GP1500M	GP2L-0015	1FM-215	4th Video IF Filament Bypass
C44	82			GP100M	GP1K-100	1FM-31	4th Video IF Cathode Bypass
C45	1500			GP1500M	GP2L-0015	1FM-215	4th Video IF Decoupling
C46	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C47	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C48	1500			GP1500M	GP2L-0015	1FM-215	Video Det.-DC Rest. Fil. Bypass
C49	10	500		1468-00001	GP1K-10	MS-4i	Video Diode Filter
C50	.05	400		P488-05		TM-15	Video Coupling
C51	.05	400		P488-05		TM-15	Video Coupling
C52	.05	400		P488-05		TM-15	Video Coupling
C53	.05	400		P488-05		TM-15	Video Coupling
C54	.25	400		P488-25		TC-2	Bias Filter

CAPACITO

ITEM No.	RATING: CAP.	RATING: VOLT	AIR KING PART No.	REPLACEMENT: AEROVOX PART No.	REPLACEMENT:
C55	1500			GP1500M	GP
C56	1500			GP1500M	GP
C57	.01	200		P488-01	82
C58	1500			GP1500M	GP
C59	1500			GP1500M	GP
C60	1500			GP1500M	GP
C61	51			GP51M	GP
C62	6500			GP6800M	GP
C63	270	500		1468-00025	GP
C64	.0025	400		P688-0022	GP
C65	.01	400		P488-01	82
C66	.01	200		P488-01	82
C67	.0025	400		P688-0022	GP
C68	.005	400		P688-005	811
C69	.005	400		P688-005	811
C70	.05	400		P488-05	
C71	270	500		1468-00025	GP
C72	.1	400		P488-1	
C73	270	500		1468-00025	GP
C74	.05	400		P488-05	
C75	.01	400		P488-01	821
C76	.02	600		P688-02	
C77	.05	400		P488-05	
C78	.05	400		P488-05	
C79	4700	500		1467-005	GP
C80	.05	600		P688-05	
C81	.1	200		P288-1	
C82	82	500		1468-0001	GP
C83	.004	200		P688-004	
C84	.05	400		P488-05	
C85	.015	400		P488-015	
C86	.015	400		P488-015	
C87	1200				N21(
C88	.0025	200		P688-0022	GP
C89	.05	400		P488-05	
C90	.004	200		P688-004	
C91	.05	400		P488-05	
C92	390	500		1468-0004	GP
C93	.01	200		P488-01	821
C94	680	500			GP
C95	.001	600		P688-001	GP
C96	.05	600		P688-05	
C97	.1	150		P288-1	
C98	.035	600		P688-033	
C99	.05	600		P688-05	
C100	500	20K			410
C101	470	500		1468-0005	GP
C102	.01	400		P488-01	821
C103	.01	400		P488-01	821

CO

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT: AIR KING PART No.	REPLACEMENT: IRC PART No.	CLA PA
R1A	10KΩ	½		B11-116 *	
B	1 Meg.	½		B13-137X *	P-91
C	Shaft End			E187 *	
D	Switch			76-1 *	
R2A	1 Meg.	½		B11-137 *	
B	50KΩ	½		B11-123 *	P-9
C	Shaft End			E187 *	
R3	50KΩ	½		Q11-123	M-4
R4	20Ω	2		W-20	43-2
R5	20Ω	2		W-20X10	43-2
R6	1500Ω	4			10-1
R7	5000Ω	½		Q11-114	M-1
R8	2.5 Meg.	½		Q11-239	M-8
R9	20KΩ	½		Q11-119	M-3

* Additional parts to be used with "Concentrikit".

R

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT: AIR KING PART No.	REPLACEMENT: IRC PART No.
R10	150Ω			
R11	150Ω			
R12	1000Ω 20%			BTS-1000
R13	4700Ω 20%			BTS-4700
R14	4700Ω 20%			BTS-4700
R15	1000Ω 20%			BTS-1000
R16	1 Meg. 20%			BTS-1 Meg.
R17	10KΩ			BTS-10K
R18	1000Ω 20%			BTS-1000
R19	100KΩ 20%			BTS-100K
R20	100KΩ 20%			BTS-100K
R21	47Ω 20%			
R22	150Ω			
R23	4700Ω 20%			BTS-4700
R24	10KΩ 5%			BTS-10K-5%
R25	39Ω			BW-½-39
R26	1000Ω 20%			BTS-1000
R27	150Ω			BW-½-150
R28	150Ω			BW-½-150
R29	1000Ω 20%			BTS-1000
R30	10KΩ 5%			BTS-10K-5%
R31	39Ω			BW-½-39
R32	1000Ω 20%			BTS-1000
R33	150Ω			BW-½-150
R34	1000Ω 20%			BTS-1000
R35	4700Ω 5%			BTS-4700-5%
R36	39Ω			BW-½-39

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp		6J6	7BF	
V2	Mixer		6J6	7BF	
V3	Oscillator		6J6	7BF	
V4	1st Video IF		6AG5	7BD	
V5	2nd Video IF		6AG5	7BD	
V6	3rd Video IF		6AG5	7BD	
V7	4th Video IF		6AG5	7BD	
V8	Video Det.-DC Restorer		6AL5	6BT	
V9	Video Amp.		6AU8	7BK	
V10	Video Output		6K8GT	7S	
V11	1st Sound IF		6BA6	7BK	
V12	2nd Sound IF		6BA6	7BK	
V13	Limiter		6AU8	7BK	
V14	Discriminator		6AL5	6BT	
V15	AF Amp.		6AT6	7BT	
V16	Audio Output		6K8GT	7S	
V17	1st Sync. Amp.		6SK7	8N	
V18	Sync. Sep.		6SH7	8BK	
V19	2nd Sync. Amp.-Hor. Disch.		6SN7GT	8BD	
V20	Vert. Osc.-Disch.		6J5	6Q	
V21	Vert. Output.		6K8GT	7S	
V22	Hor. Sync. Disc.		6AL5	6BT	
V23	Hor. AFC		6AC7	8N	
V24	Hor. Osc.		6K8GT	7S	
V25	Hor. Output		6BG6G	5BT	
V26	Damper		5V4G	5L	
V27	HV Rectifier		1B3GT	3C	
V28	LV Rectifier		5U4G	5T	
V29	LV Rectifier		5U4G	5T	
V30	Picture Tube		16AP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AFH82J16X		TVL-25	▲ Filter
B	10	450					■ Decoupling
C	80	350					▲ Filter
C2A	40	450		AFH883J		TVL-30	▲ Vert. Output Decoupling
B	40	450					■ Filter
C	10	450					▲ Vert. Output Decoupling
C3A	80	450		AFH16J10B		TVL-18	▲ Filter
B	50	50					▲ Vert. Output Cathode Bypass
C4A	40	450		AFH82J2B		TVL-53	▲ Filter
B	10	450					■ Low Pass Filter
C	10	350					▲ Decoupling
C5A	20	450		AFH4J16B		TVL-16	▲ Output Decoupling
B	80	350					▲ Filter
C6A	250	10		PRS10/250		TVL-66	▲ Horiz. Centering Control Bypass
B	1000	6		PRS8/1000			▲ Vert. Centering Control Bypass
C7	270			GP270M	GP2K-270		RF Coupling
C8	270			GP270M	GP2K-270		RF Coupling
C9	1500			GP1500M	GP2L-0015		Bias Filter
C10	10			CN10DNPO	NPOK-10		Fixed Trimmer
C11	10			CN10DNPO	NPOK-10		Fixed Trimmer
C12	1.5				NPOK-1.5		Neutralizing
C13	1.5				NPOK-1.5		Neutralizing
C14	6.8						Mixer Plate Decoupling
C15	4.7			CN4.7DNPO	NPOK-4.7		RF Coupling
C16	2.2						RF Coupling
C17	1500			GP1500M	GP2L-0015		RF Coupling
C18	22			GP22K	GP1K-22		Fixed Trimmer
C19	10			CN10DNPO	NPOK-10		Osc. Plate Decoupling
C20	1500			GP1500M	GP2L-0015		Decoupling
C21	270	500			GP2K-270		IF Coupling
C22	68			CN68JNPO	NPOM-68		Fixed Trimmer
C23	1500			GP1500M	GP2L-0015		Mixer Plate Decoupling
C24	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C25	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C26	1500			GP1500M	GP2L-0015		Mixer Filament Bypass
C27	1500			GP1500M	GP2L-0015	1FM-215	1st Video IF Filament Bypass
C28	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C29	1500			GP1500M	GP2L-0015	1FM-215	1st Video IF Decoupling
C30	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C31	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C32	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C33	1500			GP1500M	GP2L-0015	1FM-215	2nd Video IF Filament Bypass
C34	1500			GP1500M	GP2L-0015	1FM-215	2nd Video IF Decoupling
C35	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C36	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C37	1500			GP1500M	GP2L-0015	1FM-215	Bias Filter
C38	.25	400		P488-25		TC-2	Bias Filter
C39	1500			GP1500M	GP2L-0015	1FM-215	3rd Video IF Filament Bypass
C40	1500			GP1500M	GP2L-0015	1FM-215	3rd Video IF Decoupling
C41	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C42	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C43	1500			GP1500M	GP2L-0015	1FM-215	4th Video IF Filament Bypass
C44	82			GP100M	GP1K-100	1FM-31	4th Video IF Cathode Bypass
C45	1500			GP1500M	GP2L-0015	1FM-215	4th Video IF Decoupling
C46	1500			GP1500M	GP2L-0015	1FM-215	RF Bypass
C47	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C48	1500			GP1500M	GP2L-0015	1FM-215	Video Det.-DC Rest. Fil. Bypass
C49	10	500		1468-00001	GP1K-10	MS-41	Video Diode Filter
C50	.05	400		P488-05		TM-15	Video Coupling
C51	.05	400		P488-05		TM-15	Video Coupling
C52	.05	400		P488-05		TM-15	Video Coupling
C53	.05	400		P488-05		TM-15	Video Coupling
C54	.25	400		P488-25		TC-2	Bias Filter

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C55	1500			GP1500M	GP2L-0015	1FM-215	1st Sound IF Cathode Bypass
C56	1500			GP1500M	GP2L-0015	1FM-215	1st Sound IF Decoupling
C57	.01	200		P488-01	821-01	TM-11	2nd Sound IF Grid Filter
C58	1500			GP1500M	GP2L-0015	1FM-215	2nd Sound IF Cathode Bypass
C59	1500			GP1500M	GP2L-0015	1FM-215	2nd Sound IF Screen Bypass
C60	1500			GP1500M	GP2L-0015	1FM-215	2nd Sound IF Plate Decoupling
C61	91			GP91M	GP1K-51	1FM-45	Limiter Grid Filter
C62	6500			GP6500M	GP2M-0068	TM-26	Limiter Decoupling
C63	270	500		1468-00025	GP2K-270	1FM-325	RF Bypass
C64	.0025	400		P488-0022	GP2M-0025	TM-23	Audio Coupling
C65	.01	400		P488-01	821-01	TM-11	Tone Compensation
C66	.01	200		P488-01	821-01	TM-11	Audio Coupling
C67	.0025	400		P488-0022	GP2M-0025	TM-23	De-emphasis
C68	.005	400		P688-005	811-005	TM-25	Audio Coupling
C69	.005	400		P488-005	811-005	TM-25	Output Plate Bypass
C70	.05	400		P488-05		TM-15	Sync. Coupling
C71	270	500		1468-00025	GP2K-270	1FM-325	1st Sync. Amp. Plate Bypass
C72	.1	400		P488-1		TM-1	1st Sync. Amp. Plate Decoupling
C73	270	500		1468-00025	GP2K-270	1FM-325	Sync. Coupling
C74	.05	400		P488-05		TM-15	Sync. Coupling
C75	.01	400		P488-01	821-01	TM-11	Vert. Sync. Coupling
C76	.03	600		P688-02		TM-21	Integrator Network
C77	.05	400		P488-05		TM-15	Integrator Network
C78	.05	400		P488-05		TM-15	Integrator Network
C79	.05	400		1487-005	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C80	.05	600		P688-05		TM-15	Vert. Discharge
C81	.1	200		P388-1		TM-1	Vert. Sweep Coupling
C82	.03	500		1468-0001	GP1K-100	1FM-31	Horiz. Sync. Coupling
C83	.004	200		P688-004		TM-24	AFC Filter
C84	.05	400		P488-05		TM-15	AFC Filter
C85	.015	400		P488-015		MB-105	Fixed Trimmer
C86	.015	400		P488-015		MB-115	Phase Shifter
C87	1200				N2100M-1200		Phase Shifter
C88	.0025	200		P688-0022	GP2M-0025	TM-23	AGC Coupling
C89	.05	400		P488-05		TM-15	Horiz. AFC Screen Bypass
C90	.004	200		P688-004		TM-24	Horiz. Osc. Grid Cap.
C91	.05	400		P488-05		TM-15	Horiz. Osc. Screen Bypass
C92	390	500		1468-0004	GP2K-390	1FM-34	Differentiator Network
C93	.01	200		P488-01	821-01	TM-11	Horiz. Sweep Coupling
C94	680	500			GP2K-680	1FM-37	Horiz. Discharge
C95	.001	600		P688-001	GP2L-001	TM-21	Horiz. Sweep Coupling
C96	.05	600		P688-05		TM-15	Horiz. Output Screen Bypass
C97	.1	350		P388-1		TM-1	Horiz. Output Cathode Bypass
C98	.035	600		P688-033			Damper Filter
C99	.05	600		P688-05		TM-15	Damper Filter
C100	500	20K			410-500		HV Filter
C101	470	500		1468-0005	GP2K-470	1FM-35	Video Output Cathode Bypass
C102	.01	400		P488-01	821-01	TM-11	Line Filter
C103	.01	400		P488-01	821-01	TM-11	Line Filter

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	10KΩ	1		B11-116 *		Contrast control-panel
B	1 Meg.	1		B13-137X *	P-970111-7	Volume control-rear, tapped at 200KΩ
C	Shaft End			Z187 *		Attach per instructions in "Concentrikit"
D	Switch			76-1 *		Attach per instructions in "Concentrikit"
R2A	1 Meg.	1		B11-127 *		Vert. hold control-panel
B	50KΩ	1		B11-123 *	P-970111-8	Horiz. hold control-rear
C	Shaft End			Z187 *		Attach per instructions in "Concentrikit"
R3	50KΩ	1		Q11-123	M-44-8	Brightness control
R4	20Ω	2		W-20	43-20	Horiz. centering control-Wire Wound
R5	20Ω	2		W-20X10	43-20 CT	Vert. centering control-Wire Wound, tapped at 10Ω
R6	10KΩ	4		Q11-1500	10-1500	Focus control-Wire Wound
R7	500KΩ			Q11-114	M-19-5	Vert. linearity control
R8	2.5 Meg.			Q11-239	M-84-8	Height control
R9	25KΩ	2		Q11-119	M-36-8	Horiz. drive control

* Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED
R10	150Ω	1			RF Grid
R11	150Ω	1			RF Grid
R12	10000Ω 20%	1		BTS-1000	Bias Network
R13	47000Ω 20%	1		BTS-4700	RF Plate
R14	4700Ω 20%	1		BTS-4700	RF Plate
R15	1000Ω 20%	1		BTS-1000	RF Decoupling
R16	1 Meg. 20%	1		BTS-1 Meg.	Mixer Grid
R17	10KΩ	1		BTS-10K	Mixer Grid Shunt
R18	1000Ω 20%	1		BTS-1000	Mixer Plate Decoupling
R19	100KΩ 20%	1		BTS-100K	Osc. Grid
R20	100KΩ 20%	1		BTS-100K	Osc. Grid
R21	47Ω 20%	1			Osc. Cathode
R22	150Ω	1			Decoupling
R23	4700Ω 20%	1		BTS-4700	Osc. Plate
R24	10KΩ 5%	1		BTS-10K-5%	1st Video IF Grid
R25	39Ω	1		BW-½-39	1st Video IF Cathode-Wire Wound
R26	1000Ω 20%	1		BTS-1000	1st Video IF Decoupling
R27	150Ω	1		BW-½-150	Decoupling-Wire Wound
R28	150Ω	1		BW-½-150	Decoupling-Wire Wound
R29	1000Ω 20%	1		BTS-1000	Bias Network
R30	10KΩ 5%	1		BTS-10K-5%	2nd Video IF Grid
R31	39Ω	1		BW-½-39	2nd Video IF Cathode-Wire Wound
R32	1000Ω 20%	1		BTS-1000	2nd Video IF Decoupling
R33	150Ω	1		BW-½-150	Decoupling-Wire Wound
R34	1000Ω 20%	1		BTS-1000	Bias Network
R35	47000Ω 5%	1		BTS-4700-5%	3rd Video IF Grid
R36	39Ω	1		BW-½-39	3rd Video IF Cathode-Wire Wound

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIR KING PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R37	27000Ω 5%	1		BTS-2700-5%	3rd Video IF Plate
R38	10000Ω 20%	1		BTS-1000	3rd Video IF Decoupling
R39	150Ω	1		BW-½-150	Decoupling-Wire Wound
R40	150Ω	1		BW-½-150	4th Video IF Cathode-Wire Wound
R41	560000Ω 5%	1			4th Video IF Plate
R42	10000Ω 20%	1		BTS-1000	4th Video IF Decoupling
R43	8200Ω	1		BTS-8200	Bias Network
R44	18KΩ	1		BTS-18K	Bias Network
R45	10KΩ	1		BTS-10K	Bias Network
R46	680Ω	1		BTS-680	Bias Network
R47	2700Ω	1		BTS-2700	Bias Network
R48	680KΩ 5%	1		BTS-680K-5%	Voltage Divider
R49	39000Ω 5%	1		BTS-3900-5%	Video Det. Diode Load
R50	470KΩ 20%	1		BTA-470K	Video Amp. Grid
R51	3300Ω	1		BTA-3300	Video Amp. Plate
R52	680Ω	1		BTS-680	Low Pass Filter
R53	1.2 Meg. 5%	1		BTS-1.2Meg. 5%	Bias Network
R54	820KΩ 5%	1		BTS-820K-5%	Video Output Grid
R55	330Ω	1		BW-½-330	Video Output Cathode-Wire Wound
R56	3300Ω	1		BTA-3300	Video Output Plate
R57	10KΩ 5%	1		BTS-10K-5%	Isolation
R58	100KΩ	1		BTS-100K	Picture Tube Grid
R59	1 Meg. 20%	1		BTS-1 Meg.	DC Rest. Load
R60	47KΩ	1		BTS-47K	Voltage Divider
R61	150KΩ	1		BTS-150K	Voltage Divider
R62	100Ω	1		BW-½-100	1st Sound IF Cathode-Wire Wound
R63	10000Ω 20%	1		BTS-1000	1st Sound IF Decoupling
R64	470KΩ 20%	1		BTS-470K	2nd Sound IF Grid
R65	100Ω 20%	1		BW-½-100	2nd Sound IF Cathode-Wire Wound
R66	3300Ω 20%	1		BTS-3300	2nd Sound IF Screen
R67	10000Ω 20%	1		BTS-1000	2nd Sound IF Plate Decoupling
R68	22KΩ	1			Limiter Grid
R69	10KΩ	1		BTA-10K	Limiter Decoupling
R70	10KΩ	½		BTS-10K	Voltage Divider
R71	2.2Ω	1		BW-1-2.2	Disc. Filament-Wire Wound
R72	100KΩ	1		BTS-100K	Disc. Diode Load
R73	100KΩ	1		BTS-100K	Disc. Diode Load
R74	22KΩ	1		BTS-22K	De-emphasis
R75	27KΩ	1		BTS-27K	Tone Compensation
R76	10 Meg. 20%	1		BTS-10 Meg.	AF Grid
R77	330KΩ	1		BTS-330K	AF Plate
R78	270KΩ	1		BTS-270K	Output Grid
R79	2200Ω	2		BT-2-2200	Output Decoupling
R80	2200Ω	2		BT-2-2200	Output Decoupling
R81	6.8 Meg.	1		BTS-6.8 Meg.	Bias Network
R82	1 Meg. 20%	1		BTS-1 Meg.	1st Sync. Amp. Plate
R83	4700Ω	1		BTA-4700	1st Sync. Amp. Plate
R84	4700Ω	1		BTA-4700	1st Sync. Amp. Plate Decoupling
R85	4.7 Meg.	1		BTS-4.7 Meg.	Bias Network
R86	1 Meg.	1		BTS-1 Meg.	Sync. Sep. Grid
R87	6800Ω	1		BTS-6800	Sync. Sep. Plate
R88	1 Meg. 20%	1		BTS-1 Meg.	2nd Sync. Amp. Plate
R89	4700Ω	1		BTS-4700	2nd Sync. Amp. Plate
R90	1000Ω	1		BTS-1000	Decoupling
R91	22KΩ	1		BTS-22K	Voltage Divider
R92	22KΩ	1		BTS-22K	Integrator
R93	8200Ω	1		BTS-8200	Integrator
R94	8200Ω	1		BTS-8200	Integrator
R95	1.5 Meg. 5%	1		BTS-1.5 Meg. 5%	Vert. Osc. Grid
R96	220KΩ	1		BTS-220K	Vert. Osc. Plate
R97	100KΩ	1		BTS-100K	Voltage Divider
R98	2.2 Meg.	1		BTS-2.2 Meg.	Voltage Divider
R99	56KΩ	1		BTS-56K	Filter
R100	8200Ω	1		BTS-8200	Vert. Peaking
R101	1800Ω	1		BTS-1800	Vert. Output Cathode
R102	2.2 Meg.	1		BTS-2.2 Meg.	Vert. Output Grid
R103	10KΩ	1		BTA-10K	Vert. Output Decoupling
R104	1 Meg.	1		BTS-1 Meg.	Horiz. Sync. Disc. Load
R105	470KΩ	1		BTS-470K	Horiz. Sync. Disc. Load
R106	470KΩ	1		BTS-470K	Horiz. Sync. Disc. Load
R107	470KΩ	1		BTS-470K	Horiz. AFC Filter Network
R108	560Ω 5%	1		BTS-560	Horiz. AFC Grid
R109	10Ω	½		BW-½-10	Horiz. AFC Cathode-Wire Wound
R110	47KΩ 5%	1		BTA-47K-5%	Horiz. AFC Plate
R111	39KΩ 5%	1		BTA-39K-5%	Horiz. AFC Grid
R112	39KΩ 5%	1		BTA-39K-5%	Horiz. AFC Screen
R113	27KΩ	1		BTA-27K	Voltage Divider
R114	27KΩ	½		BTS-27K	Horiz. Osc. Grid
R115	5000Ω	5		AB-5000	Horiz. Osc. Plate-Wire Wound
R116	10KΩ	1		BTA-10K	Horiz. Osc. Screen
R117	6800Ω	1		BTS-6800	Differentiator
R118	220KΩ	1		BTS-220K	Horiz. Discharge Grid
R119	680KΩ 5%	1		BTS-680K-5%	Horiz. Discharge Plate
R120	6800Ω	½		BTS-6800	Horiz. Peaking
R121	470KΩ	1		BTS-470K	Horiz. Output Grid
R122	100Ω	1		BW-1-100	Horiz. Output Cathode-Wire Wound
R123	15KΩ	1		BTA-15K	Horiz. Output Screen-See Note 1
R124	18KΩ	1		BTA-18K	Horiz. Output Screen
R125	9000Ω	20			Damper Filter-Wire Wound-See Note 2
R126	3.3Ω	½			HV Rect. Filament-Wire Wound
R127	470KΩ	1			HV Filter
R128	150KΩ 20%	½		BTS-150K	Acc. Anode Load
R129A	1360Ω	17			Filter-Wire Wound
B	230Ω	10			Bias Network-Wire Wound
R130A	6750Ω	10			Bleeder-Wire Wound
B	12Ω	2			Bias Network-Wire Wound
C	93Ω	4			Bias Network-Wire Wound
R131	270Ω 6%	2		BW-2-270-5%	Focus Coil Shunt-Wire Wound
R132	18000 5%			BTA-1800-5%	Focus Coil Shunt-Wire Wound

Note 1. Some models use 22KΩ resistor in this application.
Note 2. This resistor is tapped at 1500 and 3000Ω.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIR KING PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ 2.5A	720VCT .260ADC	5VAC @ 6A	5VAC @ 2A SEC. 4 12.6VCT @ 5A		P-8156	P-3061	TP-365

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	DC RESISTANCE		AIR KING PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.					
T2	176Ω	1300Ω		A-8121	A-4000	TBO-1	Vert. Block Osc. Trans.
T3	310Ω Tap @ 100Ω	SEC. 1 10Ω Tap. @ .6Ω SEC. 2 0Ω		A-8128	HVO-3	TFB-3	Hor. Output Trans.
T4	580Ω	7Ω		A-8115	A-3035	TSO-1	Vert. Output Trans.
T5A	14Ω			DY-1	MD-1		Hor. Deflection Coil
B	60Ω						Vert. Deflection Coil
T6	415Ω				MF-2		Focus Coil

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIR KING PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T7	5.5KΩ	3.9Ω	320Ω	.3Ω		A-8114	A-2931	RO-301	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	AIR KING PART No.	VIKING PART No.	QUAM PART No.	
SP1	PM	3.9Ω		10J12	10A31	
	CONE DIA.	V. C. DIA.				
SP2	9 3/8"	3/4"				

FILTER CHOKE

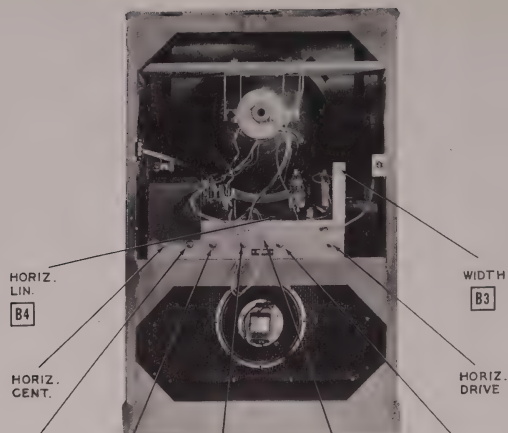
ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	AIR KING PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.260A	56Ω	2.3 Henries		C-2326	C-2991	TR-3300	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	AIR KING PART No.	MEISSNER PART No.	
L2	Ant. Trans.	0Ω				
L3	Interference Trap	0Ω				
L4	Interference Trap	0Ω				
L5	Fil. Choke	0Ω				
L6	Mixer Grid	.1Ω				
L7	1st Video IF and Sound Trap	.2Ω				
L8	Fil. Choke	0Ω				
L9	2nd Video IF	.2Ω	0Ω			
L10	Fil. Choke	0Ω				
L11	3rd Video IF	.2Ω	0Ω			
L12	Fil. Choke	0Ω				
L13	4th Video IF	.2Ω				
L14	Sound Trap	.1Ω				
L15	Fil. Choke	0Ω				
L16	Sound Trap	.1Ω				
L17	Fil. Choke	0Ω				
L18	Peaking	6Ω				180 microhenries, wound on 39KΩ resistor
L19	Peaking	8Ω				250 microhenries,
L20	Peaking	5Ω				120 microhenries, wound on 22KΩ resistor
L21	Peaking	4Ω				93 microhenries
L22	Peaking	5Ω				120 microhenries, wound on 22KΩ resistor
L23	Peaking	4Ω				93 microhenries
L24	1st Sound IF	.2Ω	0Ω			
L25	2nd Sound IF	.1Ω	0Ω			
L26	Disc. Trans.	0Ω	0Ω			
L27	Horiz. Sync. Disc. Trans.	37Ω	35Ω			Tapped at 9.5Ω
L28	Width Cont.	.6Ω				
L29	Horiz. Linearity	.37Ω				

MISCELLANEOUS

ITEM No.	PART NAME	AIR KING PART No.	NOTES
M1	RF Tuner Assy.		
M2	Fuse		Type AGC, .25A
M3	Ion Trap		



CABINET-REAR VIEW

HORIZONTAL OSCILLATOR ADJUSTMENT

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

The sync link must be in the normal position (2 to 3). After turning the horizontal hold control to the maximum counter clockwise position, the picture should remain in horizontal sync. Remove the picture momentarily by turning the contrast control fully counter-clockwise and then return it to the normal operating position. This should pull the picture back into synchronization.

Now turn the horizontal hold control fully clockwise. The picture should remain in sync. Momentarily remove the signal and again the picture should pull into sync if receiver is functioning properly.

If the receiver functions properly under these checks it is not necessary to align the horizontal oscillator circuit. However, if the picture is not normal or stable the horizontal oscillator must be aligned.

SLIGHT RETOUCH ALIGNMENT:

If the receiver failed in the above check to hold sync at either extreme of the hold control or after momentary removal of the signal, it may be possible to align the horizontal oscillator by making slight adjustments. If this fails it will be necessary to completely re-align the horizontal oscillator circuit.

Tune in a TV station and adjust tuning for best SOUND quality. Sync the picture and adjust the contrast control to slightly less than normal position. Turn the horizontal hold control to the point where the horizontal oscillator fails to hold or pull in. Remove signal. Turn B2 frequency adjustment (located at rear of chassis) until oscillator pulls into sync. Now check the pull-in and hold for the other extreme of the horizontal hold control.

COMPLETE ALIGNMENT:

Tune in a TV station for the best SOUND quality. Adjust VERTICAL hold control to vertically sync the picture and adjust the contrast control to slightly less than normal. Turn B2 frequency adjustment until picture syncs horizontally. If blanking bar is present on picture adjust B1 (phasing adjust screw) until blanking bar moves to the right and off the raster. If ripples occur in the raster turn B1 in a clockwise direction until the unstable condition is removed. The length of this adjustment screw in its correct position is usually about 1/2 inch beyond the bushing.

Turn horizontal hold control fully counter-clockwise and adjust B2 until picture fails to sync. Now slowly turn B2 to the point where the picture syncs. Readjust B1 so that the left side of picture is close to the left side of the raster but does not fold over.

Turn horizontal hold fully clockwise. Right side of picture should be close to right side of raster but does not fold over. If picture does fold over, readjust B1.

When signal is restored after momentary removal of the signal, the picture should fall into sync. If picture fails to fall into sync turn B2 counter-clockwise until picture syncs in.

Turn horizontal hold fully counter-clockwise. Picture should fall back into sync after momentary removal of signal.

If picture fails to pull in sync after momentary removals of hthe signal in both extremes of the horizontal hold control, there may not be a sufficient pull-in range, though not necessarily. A pull-in of 3/4 of the hold control range should be satisfactory.

Excessiver pull-in is objectionable because high control circuit sensitivity gives greater reaction to noise pulses. This may also affect the vertical sync and equalizing pulses which tend to cause a bend in the top portion of the raster.

HORIZONTAL LINEARITY ADJUSTMENT

Turn the horizontal drive control (R9) clockwise far as possible without crowding the right side of the picture. This position provides maximum voltage to the picture tube second anode. Adjust the width slug (B3) until the raster fills the mask horizontally. Adjust the horizontal linearity slug (B4) until the picture is symmetrical from left to right. (It may be necessary to readjust the drive , width and linearity controls to obtain the best results). Adjust the horizontal centering control to center the raster in the horizontal plane.

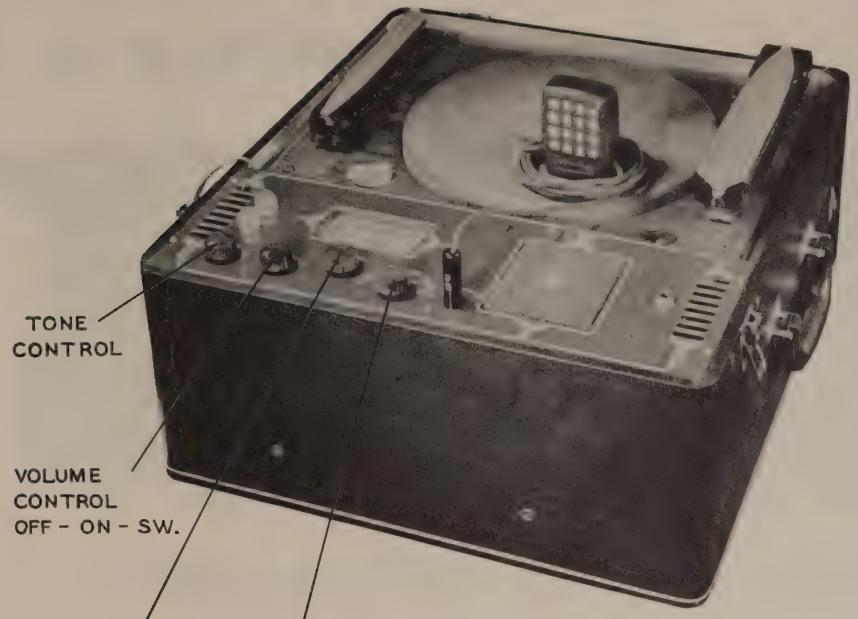
If continued adjustments of the drive, width and linearity controls fail to give the proper results, it may necessitate moving the tap on resistor R125 which is located in the high voltage compartment. After this tap has been moved it will be necessary to repeat the linearity adjustments.

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove four screws holding rear cover. Remove cover.
3. Remove two screws holding antenna terminal strip to cabinet.
4. Remove three screws holding power interlock socket to cabinet.
5. Remove picture tube base socket and high voltage cap.
6. Disconnect focus and deflection coil plugs.
7. Remove speaker plug.
8. Remove ground wire from 1/4" hex head bolt on rear of TV chassis.
9. Remove five 7/16" hex head bolts holding TV chassis. Remove chassis.
10. Remove four 11/32" hex bolts holding speaker. Remove speaker.

KINESCOPE REMOVAL

1. Remove beam bender.
2. Remove four wing nuts and bolts holding focus coil. Remove coil.
3. Remove eight screws holding front wooden tube mounting to cabinet. (This mounting is in two halves.)
4. Remove two wing nuts and bolts holding deflection coil. Remove coil.
5. Remove picture tube carefully.



AIRLINE MODEL
84GAA3967A

AIRLINE MODEL
84GAA3967A

AIRLINE MODEL 84GAA3967A

TRADE NAME	Airline, Model 84GAA3967A
SUPPLIER	Montgomery Ward and Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	AC Operated Combination Recorder-Phono-Radio, Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types 6SA7GT Converter, 6SK7GT IF Amp., 6SQ7GT DET-AVC-AF, 6SJ7GT Mic. Pre Amp., 6V6GT Power Output, 6X5GT Rectifier
POWER SUPPLY	105-125 Volts AC RATING .41 Amp. at 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer parallel with base of dial.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Turn the function selector switch to "Radio".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to stator on rear section of tuning gang. Low side to chassis.	455KC (400 ∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Adjust end plates of oscillator section of tuning gang. Repeat steps 2 and 3 until no further improvement can be made.

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PARTS LIST AND DESCRIPTIONS

AIRLINE MODEL 84GAA3967A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	6SA7GT	6SA7GT	8AD	
V2	IF Amp.	6SK7GT	6SK7GT	8N	
V3	DET.-AVC-AF	6SQ7GT	6SQ7GT	8Q	
V4	Mic. Pre Amp.	6SJ7GT	6SJ7GT	8N	
V5	Power Output	6V6GT	6V6GT	7AC	
V6	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	15	450	1005	AF444J4A		EL-431	▲ Filter
B	10	450					■ Filter
C	10	450					▲ Filter
D	20	25					Output Cathode Bypass
C2	10	25	1002	PRS25/10		TA-10	Mic. Pre-Amp. Cath. Bypass-Note 2
C3	.1	400	807	P488-1		TM-1	AVC Filter
C4A	100		*	GP100M	GP1K-100	1FM-31	Diode RF Filter
B	100			GP100M	GP1K-100	1FM-31	Diode RF Filter
C5	1000		†	GP1000M	GP2L-001	1FM-21	Tone Compensation
C6	10000		‡	GP10000M	821-01	TM-11	Audio Coupling
C7	10000		§	GP10000M	821-01	TM-11	Audio Coupling
C8	250	500	809	GP250M	GP2K-250	1FM-325	AF Amp. Plate Bypass
C9	10000		#	GP10000M	821-01	TM-11	Audio Coupling
C10	.05	600	803-B	P688-05		TM-15	Tone Compensation-See Note 1
C11	.002	600	810	P688-002	GP2M-002	TM-22	Output Plate Bypass
C12	.1	400	807	P488-1		TM-1	Decoupling
C13	.01	600	802-A	P688-01	821-01	TM-11	Line Filter

* Items C4A, C4B and R8 are combined into one unit obtainable under MFGR'S Part No. 811
† Items C5 and R6 are combined into one unit obtainable under MFGR'S Part No. 812
‡ Items C6 and R9 are combined into one unit obtainable under MFGR'S Part No. 813
§ Items C7 and R11 are combined into one unit obtainable under MFGR'S Part No. 814
# Items C9 and R10 are combined into one unit obtainable under MFGR'S Part No. 814.
Note 1. Some models use .006MFD in this application.
Note 2. Some models use 25MFD in this application.

CONTROLS

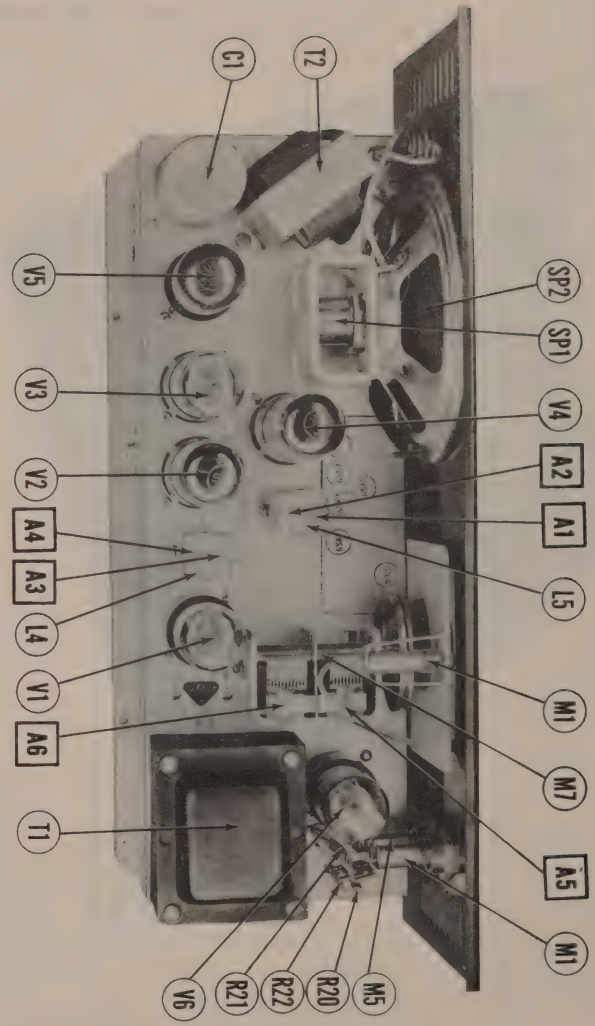
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	401	QI3-133	AM-60-Z	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2A	50KΩ	½	403	QI3-123	AM-46-Z	Tone control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R3	22KΩ	½	517	BTS-22K	Osc. Grid
R4	15KΩ	2	606	BT-2-15K	Voltage Divider
R5	15KΩ	2	606	BT-2-15K	Decoupling
R6	5 Meg.	½	†	BTS-4.7 Meg.	Tone Compensation
R7	2.2 Meg.	½	615	BTS-2.2 Meg.	AVC Network
R8	50KΩ	½	*	BTS-47K	Diode Filter
R9	5 Meg.	½	‡	BTS-4.7 Meg.	AF Grid
R10	250KΩ	½	#	BTS-270K	AF Plate
R11	250KΩ	½	§	BTS-270K	Mic. Pre-Amp. Plate
R12	2200Ω	½	504	BTS-2200	Mic. Pre-Amp. Cathode
R13	5.1 Meg.	½	525	BTS-4.7 Meg.	Mic. Pre-Amp. Grid
R14	2.2 Meg.	½	615	BTS-2.2 Meg.	Feedback
R15	510KΩ	½	501	BTS-470K	Output Grid
R16	330Ω	1	602	BTA-330	Output Cathode
R17	50KΩ	½	523	BTS-47K	Tone Compensation
R18	8.2Ω	½	527	BW-½-8.2	Voice Coil Shunt
R19	4.7Ω	1	526	BW-1-4.7	Voice Coil Shunt-Wire Wound
R20	250KΩ	½	529	BTS-270K	Voltage Divider
R21	510KΩ	½	501	BTS-470K	Series Neon
R22	510KΩ	½	501	BTS-470K	Series Neon
R23	1000Ω	1	607	BW-1-1000	Filter
R24	47Ω	½		BW-½-47	AF Cathode- See Note

†, *, ‡, #, § -- See notes under capacitors. Note Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .45A	550VCT .062ADC	6.3VAC @ 2.4A		1101	P-6011 ①	P-2951 ①	PH-70B ①

① Add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRLINE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	3.9KΩ	3.3Ω	330Ω	.7Ω SEC. 2 1670Ω	1202				

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AIRLINE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-105		
SP1	PM	3.3Ω	2603	MOD. P5-X	5A1	
	CONE DIA.	V. C. DIA.				
SP2	4 1/2"	9/16"				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∞)	AIRLINE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.062A	250Ω	4.8 Henries	1301	C-1709 ②	C-2975 ②	R-650 ②	② Drill one new mounting hole.

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.
L2	Loop Ant.	1.5Ω		1512	
L3	Osc. Coil	7Ω		1403	14-1073
L4	1st IF Trans.	13Ω	13Ω	1402	16-6678
L5	2nd IF Trans.	13Ω	13Ω	1402	16-6678

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					AIRLINE PART No.		
M1	Bayonet	6-8	.15	Brown	1513		Type #47

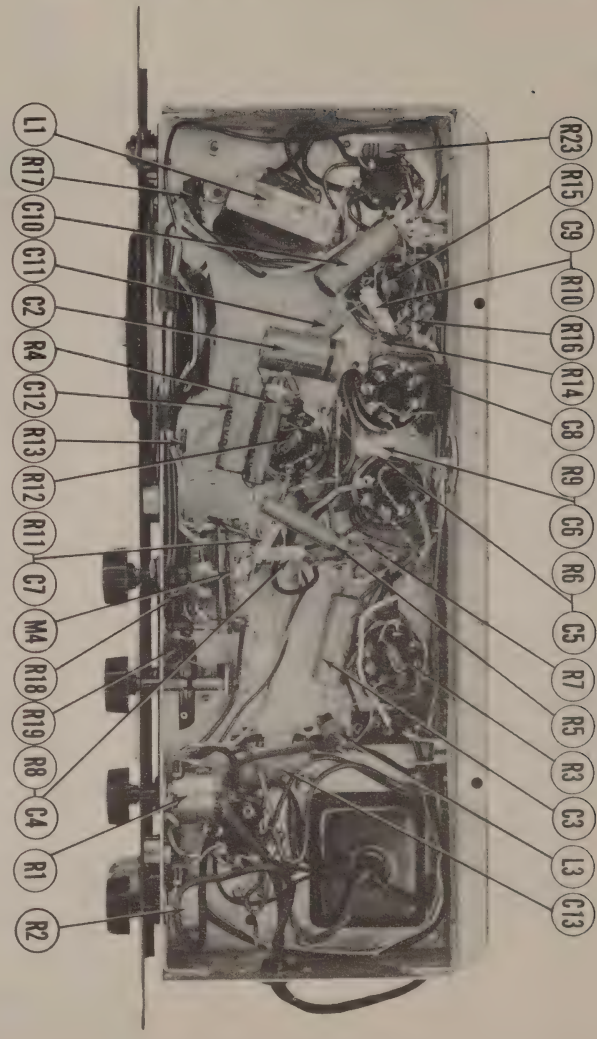
PHONO CARTRIDGE and NEEDLE

ITEM No.	REPLACEMENT DATA						REMARKS
	AIRLINE PART No.	ASTATIC PART No.		SHURE PART No.			
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE		
M2	13633	L-40A	Optional	W42B	Optional	Pickup	
M3	12126	X-26				Cutter	

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M4	Switch	2204	Function
M5	Neon Bulb	2202-A	NE-51
M6	Neon Bulb	2202-A	NE-51
M7	2 Gang Var. Cap.	1004	(18-394MMF, 31-202MMF)
	Dial Scale	1722	
	Dial Pointer	1736	
	Case	2103-A	
	Microphone	2510	

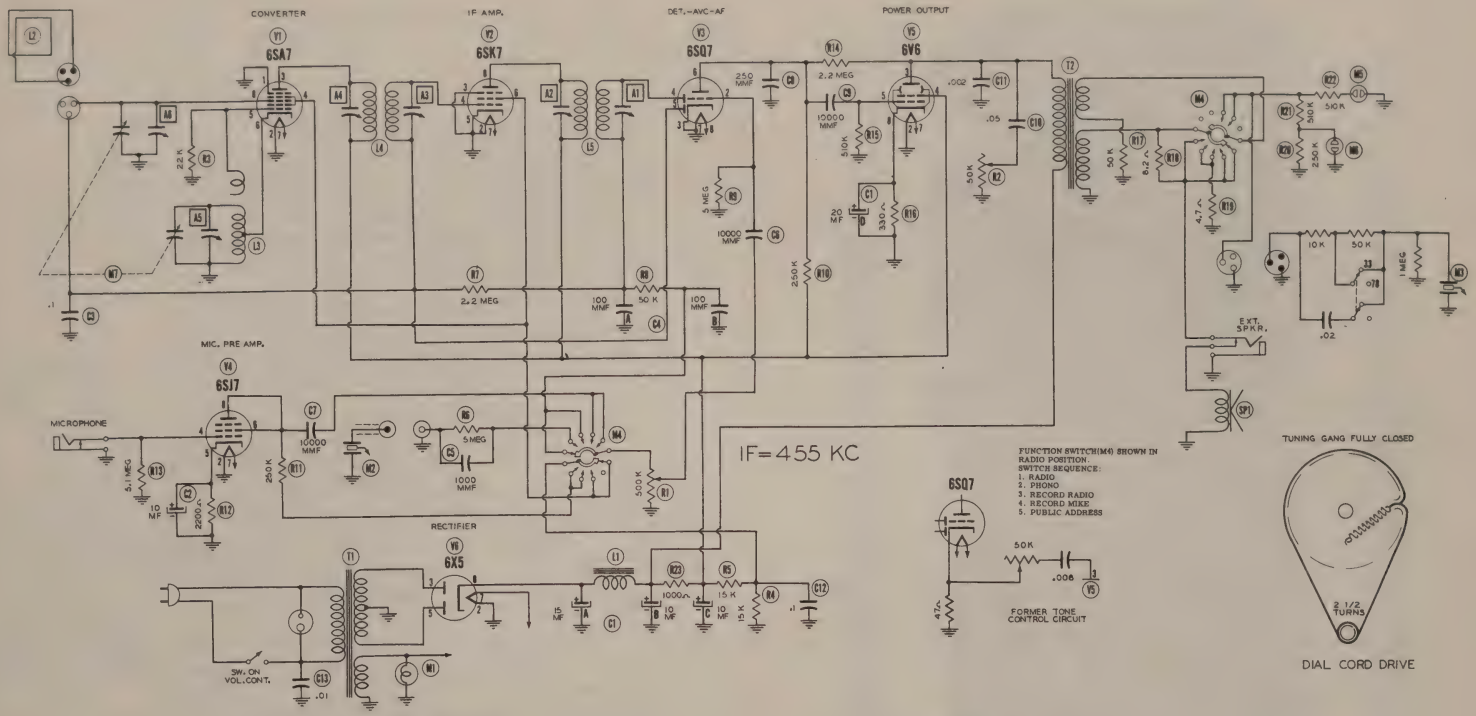
CHASSIS—BOTTOM VIEW



SET 91 FOLDER 3 R

AIRLINE MODEL 84GA4396TA

AIRLINE MODEL 84GA4396TA



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SA7GT	0V.	0V.	250VDC	75VDC	6-6.2VDC	0V.	6.3VAC	-.5VDC
V 2	6SK7GT	0V.	0V.	0V.	-.5VDC	0V.	75VDC	6.3VAC	250VDC
V 3	6SQ7GT	0V.	-.8VDC	0V.	-.6VDC	-.5VDC	105VDC	6.3VAC	0V.
V 4	6SJ7GT	0V.	0V.	.8VDC	0V.	.8VDC	12VDC	6.3VAC	12VDC
V 5	6V6GT	0V.	0V.	270VDC	250VDC	0V.	0V.	6.3VAC	15VDC
V 6	6X5GT	0V.	0V.	280VAC	0V.	280VAC	0V.	6.3VAC	300VDC

‡ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SA7GT	0Ω	0Ω	†1.2KΩ	†16KΩ	22KΩ	.5Ω	.1Ω	2.7 Meg.
V 2	6SK7GT	0Ω	0Ω	0Ω	2.7 Meg.	0Ω	†16KΩ	.1Ω	†1.2KΩ
V 3	6SQ7GT	0Ω	5 Meg.	0Ω	550KΩ	2.7 Meg.	†250KΩ	.1Ω	0Ω
V 4	6SJ7GT	0Ω	0Ω	2.2KΩ	5 Meg.	2.2KΩ	†265KΩ	.1Ω	†265KΩ
V 5	6V6GT	0Ω	0Ω	†800Ω	†1.2KΩ	510KΩ	50KΩ	.1Ω	330Ω
V 6	6X5GT	0Ω	0Ω	180Ω	Inf.	190Ω	Inf.	.1Ω	30KΩ

† MEASURED FROM PIN 8 OF V6.
¶ TAKEN IN RECORD MIC. POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

EMERSON MODEL 643A (Ch. 120111A)
(BATTERY-LINE OPERATED)

EMERSON MODEL 643A (Ch. 120111A)
(BATTERY-LINE OPERATED)

EMERSON MODEL 643A

TRADE NAME	Emerson, Model 643A (Ch. 120111A)
MANUFACTURER	Emerson Radio and Phonograph Corp., 111 8th Ave., New York 11, New York
TYPE SET	Three Power Operated Portable Multi-Band Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types 1L6 Converter, 1U4 IF Amp., 1U5 DET-AVC-AF, 3V4 Power Output, 117Z3 Rectifier
POWER SUPPLY RATING	110-120 Volts AC-DC, 220-240 Volts AC or 9 Volts "A" Supply and 90 Volts "B" Supply .15 Amp. at 117 Volts AC or 50MA at 9 Volts DC and 11MA at 90 Volts DC
TUNING RANGE—BROADCAST	535-1620KC SHORT WAVE #1 2.75-5.6MC. #2 5.5-10.3MC #310-18.5MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning gang fully closed and set the left hand edge of the pointer one inch to the right of the left hand end of the dial backplate.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (Grid) of 1L6 (V1). Low side to chassis.	455KC (400~ Mod.)	BC (maximum CCW)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1620KC	"	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	"	Tune for max. output	"	A5	"
4.	Replace set in cabinet.							
5.	200MMF	High side to external antenna terminal. Low side to chassis.	5.4MC	SW 1 (second pos. CW)	5.4MC	"	A6, A7	Adjust for maximum output.
6.	200MMF	"	10MC	SW 2 (third pos. CW)	10MC	"	A8, A9	"
7.	200MMF	"	18MC	SW 3 (max. CW)	18MC	"	A10, A11	"

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PARTS LIST AND DESCRIPTIONS

EMERSON MODEL 643A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	800043	1L6		
V2	IF Amp.	800017	1U4	6AR	
V3	DET.-AVC-AF	800019	1U5	6BW	
V4	Power Output	800018	3V4	6BX	
V5	Rectifier	800013	117Z3	4CB	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: EMERSON PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	150	925059	AF1686D20A		EL-452	▲ Filter
B	40	150				TVA-8	■ Filter
C	30	150					▲ Filter
D	100	25					Filament Bypass
C2	.001	600	920170	P688-01	GP2L-001	TM-21	Ant. Coupling
C3	2.5		915005	GP5K	NPOK-3	MS-55	Ant. Coupling
C4	265	500	915021				Fixed Padder
C5	301	500	915019	1469-0003		MS-33	Fixed Padder
C6	347	500	915022	1469-00035			Fixed Padder
C7	7.5		928105A	GP10K	NPOK-8.2	MS-41	Ant. Coupling
C8	212		910000	GP220M	GP2K-220	1FM-32	RF Coupling
C9	212		910000	GP220M	GP2K-220	1FM-32	Osc. Feedback
C10	47		928038	GP47K	GP1K-47	1FM-45	Osc. Grid Cap.
C11	.05	200	920060	P288-05		TM-15	Conv. Screen Bypass
C12	.01	400	920090	P488-01	821-01	TM-11	IF Grid Filter
C13	.05	200	920060	P288-05		TM-15	AVC Filter
C14A	110		*	GP100M	GP1K-100	1FM-31	Diode RF Filter
B	110			GP100M	GP1K-100	1FM-31	Diode RF Filter
C15	.002	400	920515	P688-002	GP2M-002	TM-22	Audio Coupling
C16	.01	400	920090	P488-01	821-01	TM-11	AF Amp. Screen Bypass
C17	212		928104	GP220K	GP2K-220	1FM-32	AF Amp. Plate Bypass
C18	.005	600	920180	P688-005	811-005	TM-25	Audio Coupling
C19	.005	400	920180	P688-005	811-005	TM-25	Output Plate Bypass
C20	.1	200	920040	P288-1		TM-1	Filament Bypass
C21	.05	200	920060	P288-05		TM-15	Filament Bypass
C22	.05	400	920539	P488-05		TM-15	Line Filter
C23	2.2		915005				Neutralizing

* Items C14A, C14B and R7 are combined into one unit obtainable under MFGR'S part No. 928032.

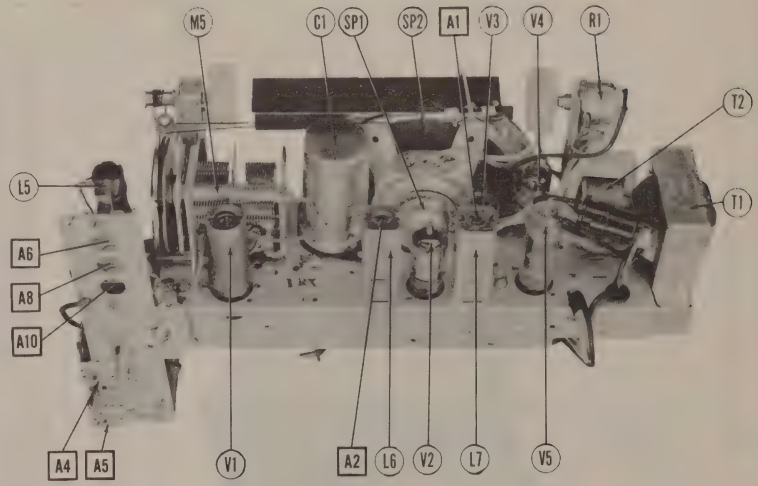
CONTROLS

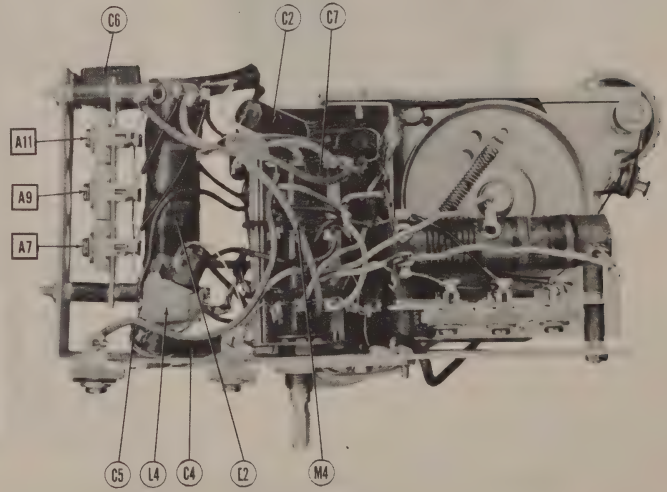
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	390063	Q13-137	390063	Volume control
B	Switch		Not Req.	76-2		Attach to R1A per instructions

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	IDENTIFICATION CODES
R2	470KΩ	½	351130	BTS-470K	AVC Network
R3	1 Meg.	½	351210	BTS-1 Meg.	Conv. Grid
R4	220KΩ	½	351050	BTS-220K	Osc. Grid
R5	82KΩ	½	340950	BTS-82K	Osc. Anode
R6	3.3 Meg.	½	351330	BTS-3.3 Meg.	IF Grid
R7	47KΩ	½	*	BTS-47K	Diode Filter
R8	2.2 Meg.	½	351290	BTS-2.2 Meg.	AVC Network
R9	10 Meg.	½	351450	BTS-10 Meg.	AF Grid
R10	3.3 Meg.	½	351330	BTS-3.3 Meg.	AF Screen
R11	470KΩ	½	351130	BTS-470K	AF Plate
R12	1.5 Meg.	½	351250	BTS-1.5 Meg.	Output Grid
R13	680Ω	1	340450	BTA-680	Filament String
R14	1500Ω	½	340530	BTS-1500	Filament String
R15	27Ω	½	340110	BW-½-27	Filament String
R16	820Ω	½	340470	BTS-820	Filament String
R17	390Ω	1	370390	BTA-390	Filament String
R18	1500Ω	½	340530	BTS-1500	Filter

CHASSIS—TOP VIEW





PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	EMERSON PART No.	IRC PART No.	
R19A	1100Ω	10	394041		Filter-Wire Wound
B	1100Ω				Filament Dropping-Wire Wound
R20	39Ω	1	370150		Surge Limiter

* Items C14A, C14B and R7 are combined into one unit, obtainable under MFGR'S part No. 928032.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	EMERSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	220VAC Tap② 115VAC				720021			SP-400

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		EMERSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	9KΩ	3.7Ω	400Ω	.4Ω	734039	A-3329	A-2932		

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			EMERSON PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.				
SP1	PM	3.9Ω	180052			
	CONE DIA.	V. C. DIA.				
SP2	4 3/4"	9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	EMERSON PART No.	MEISSNER PART No.	
L1	Loop Ant.	3Ω		700042		
L2A	Ant. Coil	.5Ω	1.2Ω	710027		SW 1 (2.75-5.6MC)
B	Ant. Coil	.9Ω	.6Ω			SW 2 (5.5-10.3MC)
C	Ant. Coil	.9Ω	.1Ω			SW 3 (10-18.5MC)
L3	RF Choke	11Ω		708095		
L4	Osc. Coil	2Ω	9Ω	716045	14-1074	BC (535-1620KC)
L5A	Osc. Coil	1Ω	1.5Ω	716046		SW 1 (2.75-5.6MC)
B	Osc. Coil	1Ω	.2Ω			SW 2 (5.5-10.3MC)
C	Osc. Coil	1Ω	.1Ω			SW 3 (10-18.5MC)
L6	1st IF Trans.	21Ω	21Ω	720525	16-6668	Alternate Part #720062
L7	2nd IF Trans.	25Ω	34Ω	720066A	16-6669	

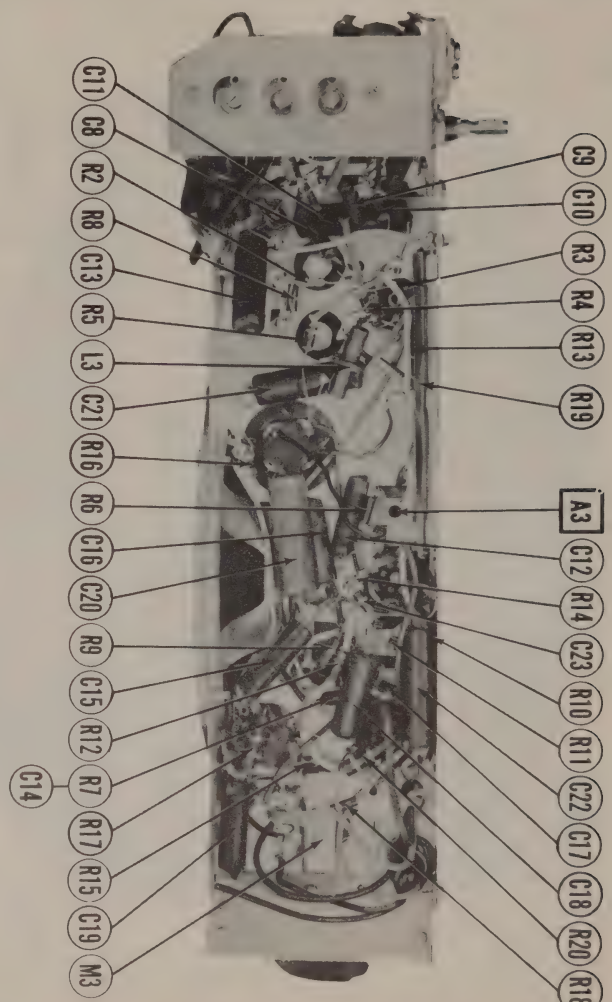
BATTERIES

ITEM No.	VOLTAGE	EMERSON PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M1	9V "A"		746			G3			2 used in series
M2	90V "B"			482			M30		2 used in series

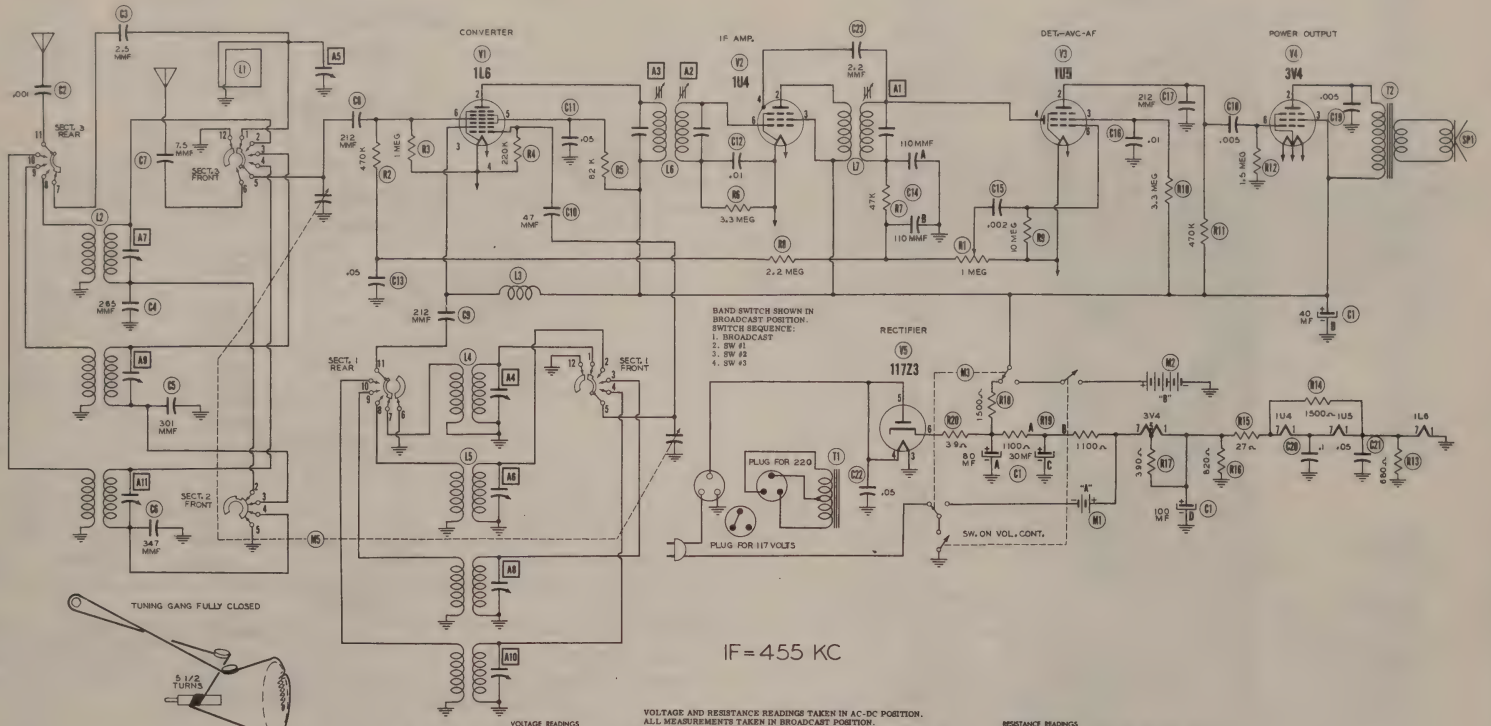
MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M3	Switch	510008	AC/DC-Battery
M4	Switch	510066	Band
M5	2 Gang Var. Cap.	900067	(12-382MMF, 10-112MMF)
A5	Trimmer	900031	BC Ant. Adj.
	Cabinet	140316	
	Knob	460104	Tuning and Volume
	Knob	450117	Band Switch
	Dial Crystal	520116	
	Dial Pointer	525041	

CHASSIS—BOTTOM VIEW



EMERSON MODEL 643A



VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.
ALL MEASUREMENTS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1L6	0V.	92VDC	92VDC	6-7.3VDC	45VDC	0V.	1.6VDC
V 2	1U4	2.9VDC	92VDC	92VDC	0V.	2.9VDC	0V.	4VDC
V 3	1U5	1.8VDC	40VDC	17VDC	.2VDC	.2VDC	0V.	2.9VDC
V 4	3V4	5.7VDC	90VDC	92VDC	1.4VDC	6.7VDC	.1VDC	8.4VDC
V 5	117Z3	117VAC	112VDC	0V.	117VAC	117VAC	118VDC	0V.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1L6	*	†1.5KΩ	†1.5KΩ	220KΩ	†85KΩ	900KΩ	*
V 2	1U4	*	†1.5KΩ	†1.5KΩ	Inf.	*	3.3 Meg.	*
V 3	1U5	*	†470KΩ	†3.3Meg.	1 Meg.	900KΩ	10 Meg.	*
V 4	3V4	*	†1.8KΩ	†1.5KΩ	1 Meg.	*	1.5 Meg.	*
V 5	117Z3	65Ω	2.5KΩ	0Ω	65Ω	65Ω	2.4KΩ	Inf.

* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM PIN 6 OF V5.

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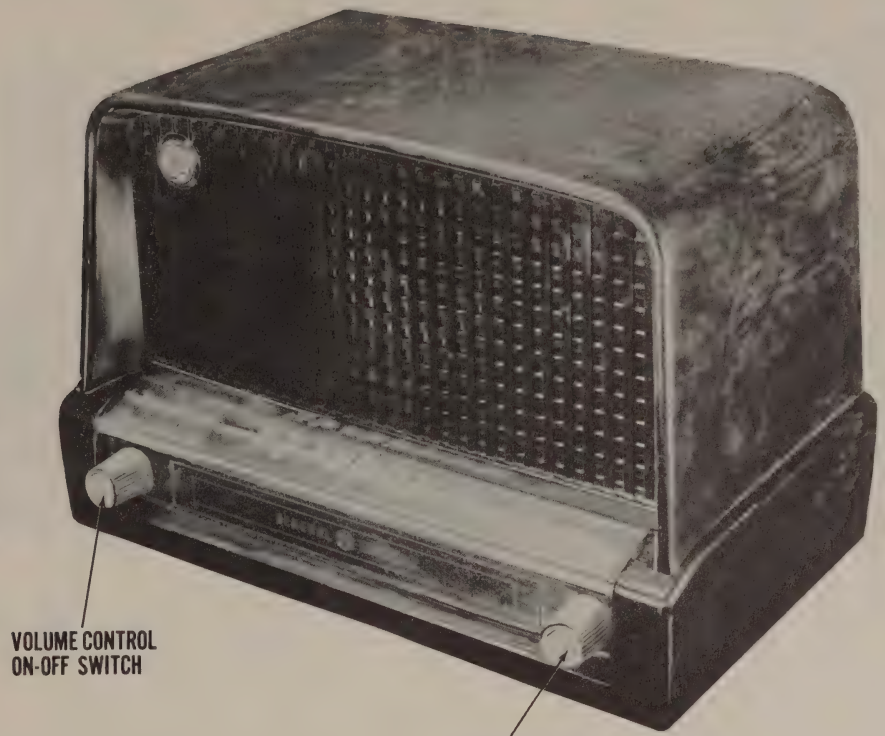
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

GENERAL ELECTRIC
MODEL 226



GENERAL ELECTRIC
MODEL 226

GENERAL ELECTRIC MODEL 226

TRADE NAME	General Electric, Model 226
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, New York
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 DET AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .25 Amp. at 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning gang fully closed and set the pointer 1 15/16 inches to the right of the left hand end of the dial backplate.

Use isolation transformer if available. If not connect a .1MFD capacitor in series with low side of signal generator and B-. Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 8 (Grid) of 12SA7 (V2). Low side to B-.	455KC (400 ∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1500KC	"	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: G. E. PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	12SK7	12SK7	8N	
V2	Converter	12SA7	12SA7	8R	
V3	IF Amp.	12SK7	12SK7	8N	
V4	DET.-AVC-AF	12SQ7	12SQ7	8Q	
V5	Power Output	35L6GT	35L6GT	7AC	
V6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: G. E. PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	RCE-050	PRSA150/50-50		TA-505	Filter-Red
B	50	150					Filter-Red
C2	100	500	UCU-028	1468-0001	GP1K-100	1FM-31	RF Coupling
C3	.05	400	UCC-045	P488-05		TM-15	AVC Filter
C4	.05	400	UCC-045	P488-05		72P51	Line Isolation
C5	.05	400	UCC-045	P488-05		TM-15	RF Bypass
C6	47	500	UCU-020	1468-00005	GP1K-47		Osc. Grid Cap.
C7A	220		RCW-3013	GP220M	GP2K-220	84C3	Diode RF Filter
B	2000			GP2000M	GP2M-002		Audio Coupling
C	220			GP220M	GP2K-220		AF Amp. Plate Bypass
D	5000			GP5000M	811-005		Audio Coupling
C8	.02	600	UCC-041	P688-02		TM-12	Output Plate Bypass
C9	.05	600	UCC-045	P688-05		TM-15	Line Filter

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: G. E. PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	RRC-077		AM-60-Z	Volume control
B	Shaft		Not Req.		KSS-3 *	Attach to R1A per instructions
C	Switch		Not Req.		SW-A	Attach to R1A per instructions

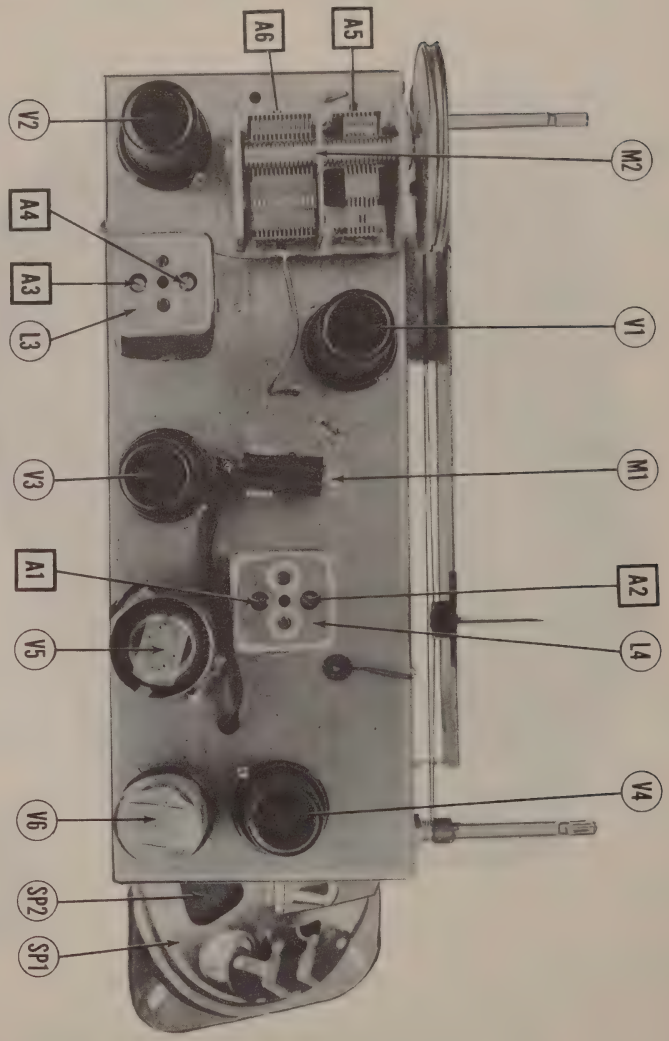
* Wrap scotch tape around shaft adjacent to guide disc for drive cord surface.

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: G. E. PART No.	IRC PART No.	IDENTIFICATION CODES
R2	150Ω	½	URD-029	BW-½-150	RF Cathode-See Note 1
R3	5600Ω	½		BTS-5600	RF Plate-See Note 2
R4	24KΩ	½	URD-081	BTS-22K	Conv. Grid
R5	24KΩ	½	URD-081	BTS-22K	Osc. Grid
R6	2.2 Meg.	½	URD-129	BTS-2.2 Meg.	AVC Network
R7	4.7 Meg.	½	URD-137	BTS-4.7 Meg.	AF Amp. Grid
R8	470KΩ	½	URD-113	BTS-470K	AF Amp. Plate
R9	1 Meg.	½		BTS-1 Meg.	Output Grid -See Note 3
R10	130Ω	½			Output Cathode-See Note 4
R11	1500Ω	2	URF-053	BW-2-1500	Filter-See Note 5
R12	22Ω	½	URD-009		Surge Limiter
R13	470KΩ	½	URD-113	BTS-470K	Isolation

Note 1. Not used in all models.
Note 2. Some models use 4700Ω resistor in this application.
Note 3. Some models use 470KΩ resistor in this application.
Note 4. Some models use 150Ω resistor in this application.
Note 5. Late production models use 1000Ω resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		G. E.	STANCOR	MERIT	CHICAGO	
	PRI.	SEC.	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	
T1	2.5KΩ	4Ω	156Ω Tap. ② 4.2Ω	.42Ω	RTO-075	A-3330	A3031	RO-3	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			G. E. PART No.	VIKING PART No.	QUAM PART No.	
	FIELD	V. C. IMP.				
SP1	PM	4Ω	UOP-577	525J4	52A21	
	CONE DIA.	V. C. DIA.				
SP2	5 1/8"	9/16"				

R F COILS

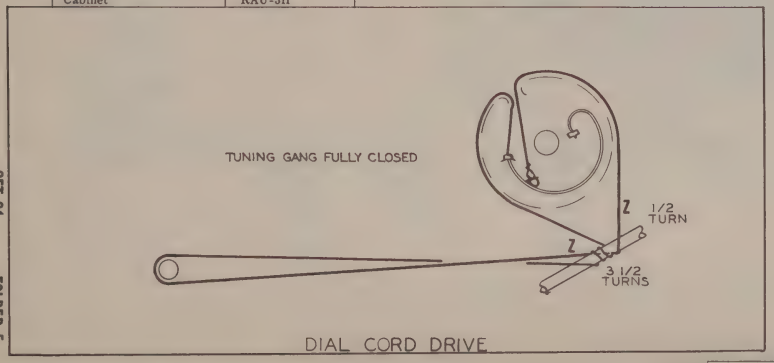
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	G. E. PART No.	MEISSNER PART No.
L1	Loop Ant.	3.2Ω		RAB-108	
L2	Osc. Coil	.6Ω	7.8Ω	RLC-090	14-1073
L3	1st IF	17Ω	17Ω	RTL-092	16-6658
L4	2nd IF	24Ω	24Ω	RTL-093	16-6660

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					G. E. PART No.		
M1A	Bayonet	7.5	.2	White			Type # 51
B	Bayonet	6-8	.15	Brown			Type # 47 (Alternate)

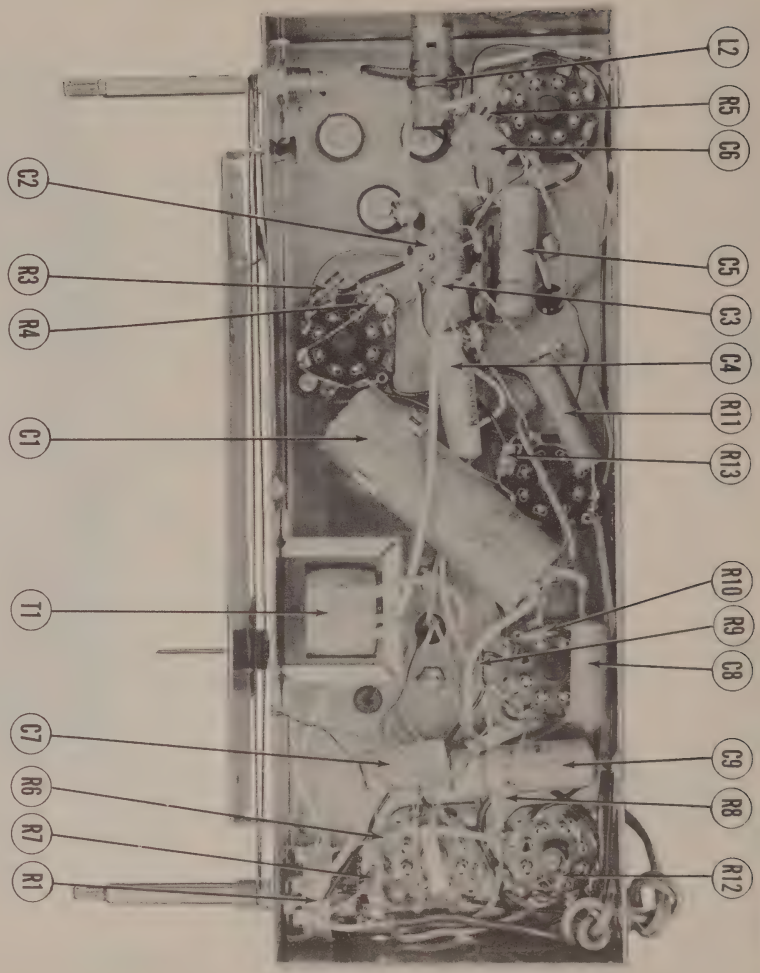
MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M2	2 Gang. Var. Cap.	RCT-036	(26-498MMF, 19-190MMF)
	Dial Scale	RDS-089	
	Dial Pointer	RDP-049	
	Knob	RDK-181	
	Cabinet	RAU-311	



DIAL CORD DRIVE

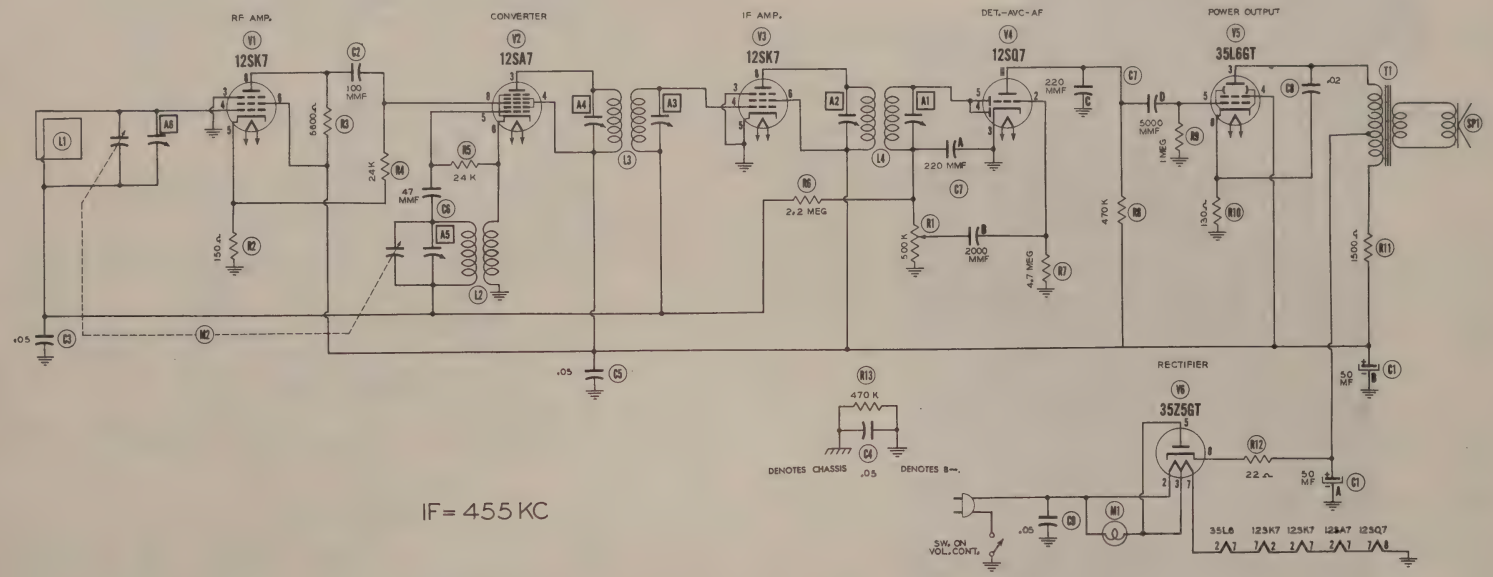
CHASSIS—BOTTOM VIEW



SET 91 FOLDER 5

GENERAL ELECTRIC MODEL 226

GENERAL ELECTRIC MODEL 226



IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	0V.	40VAC	0V.	-.7VDC	0V.	72VDC	26VAC	34VDC
V 2	12SA7	0V.	26VAC	72VDC	72VDC	5-6.9VDC	0V.	12VAC	-.1VDC
V 3	12SK7	0V.	40VAC	0V.	-.7VDC	0V.	72VDC	50VAC	72VDC
V 4	12SQ7	0V.	-.6VDC	0V.	-.6VDC	-.6VDC	50VDC	13VAC	0V.
V 5	35L6GT	0V.	87VAC	117VDC	72VDC	0V.	0V.	50VAC	3.7VDC
V 6	35Z5GT	0V.	117VAC	113VAC	123VDC	113VAC	-.7VDC	87VAC	122VDC

‡ TAKEN WITH VACUUM TUBE VOLTMETER.
ALL VOLTAGES MEASURED FROM PIN 8 OF V4 (B-).

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	0Ω	▲38Ω	▲0Ω	▲2.7 Meg.	▲0Ω	†1.8KΩ	▲25Ω	†7.4KΩ
V 2	12SA7	0Ω	▲25Ω	†1.8KΩ	†1.8KΩ	▲24KΩ	▲.6Ω	▲13Ω	▲24KΩ
V 3	12SK7	0Ω	▲38Ω	▲0Ω	▲2.7Meg.	▲0Ω	†1.8KΩ	▲50Ω	†1.8KΩ
V 4	12SQ7	0Ω	▲4.7Meg.	▲0Ω	▲500KΩ	▲500KΩ	†470KΩ	▲13Ω	▲0Ω
V 5	35L6GT	Inf.	▲80Ω	†175Ω	†1.8KΩ	▲1 Meg.	▲0Ω	▲50Ω	▲135Ω
V 6	35Z5GT	Inf.	▲110Ω	▲105Ω	▲100KΩ	▲105Ω	▲2.5Meg.	▲80Ω	▲100KΩ

▲ MEASURED FROM PIN 8 OF V4 (B-).
† MEASURED FROM PIN 8 OF V6.

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

HALLICRAFTERS MODELS
T-54, 505, 506, 514

IMPORTANT FILING NOTICE

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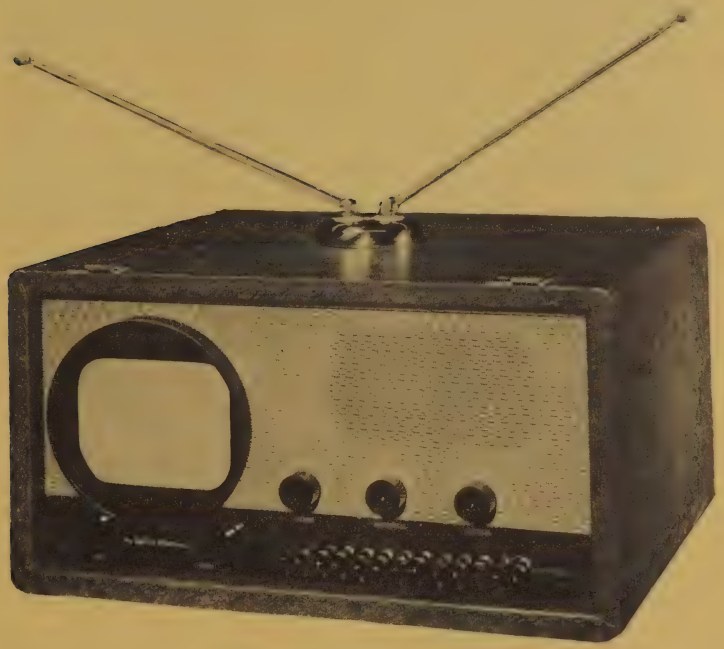
Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 514

HALLICRAFTERS MODELS
T-54, 505, 506, 514

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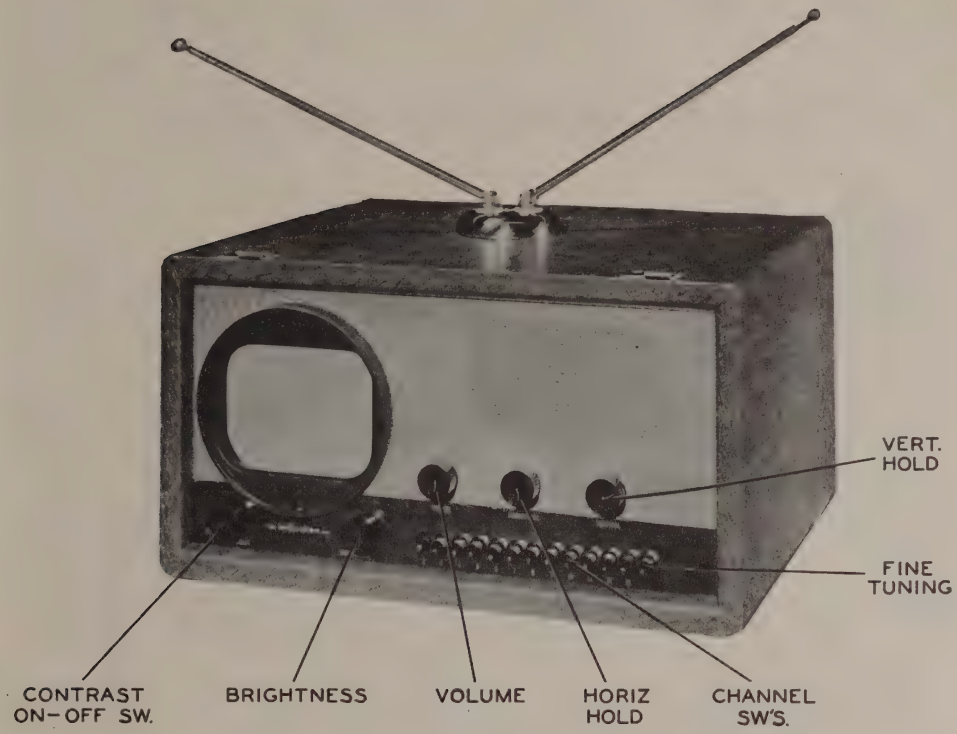
Date 4/50 Set No. 91—Folder No. 6



HALLICRAFTERS MODELS
T-54, 505, 506, 514

HALLICRAFTERS MODEL 514

TRADE NAME	Hallicrafters, Models T-54, 505, 506, 514
MANUFACTURER	The Hallicrafters Co., 4401 W. 5th Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty Two
POWER SUPPLY	105-125 Volts AC
RATING	1.05 Amp. at 117 Volts AC
TUNING RANGE—Channels 2 thru 13	

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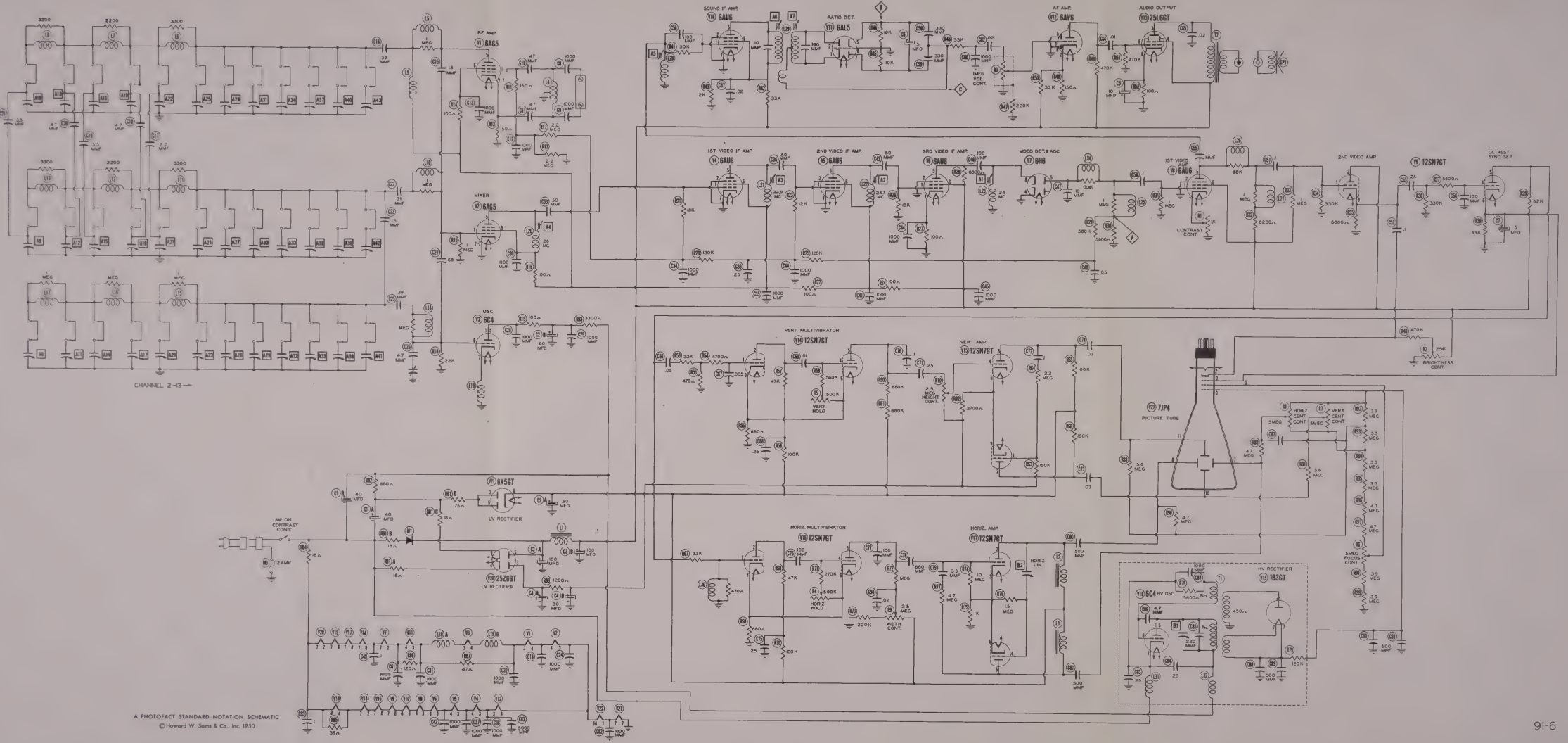
SOUND IF AMP
V16 6AU6
RATIO DET.
V11 6AL5
AF AMP.
V17 6AV6
AUDIO OUTPUT
V13 25L6GT
1ST VIDEO IF AMP.
V14 6AU6
2ND VIDEO IF AMP.
V15 6AU6
3RD VIDEO IF AMP.
V16 6AU6
VIDEO DET. & AGC
V7 6H6
1ST VIDEO AMP.
V8 6AU6
2ND VIDEO AMP.
V9 12SN7GT
DC REST. SYNC. SEP.
RF AMP.
V1 6AG5
MIXER
V2 6AG5
OSC.
V3 6C4
VERT. MULTIVIBRATOR
V14 12SN7GT
VERT. AMP.
V15 12SN7GT
HORIZ. MULTIVIBRATOR
V16 12SN7GT
HORIZ. AMP.
V17 12SN7GT
V12 7JP4
PICTURE TUBE
V11 6X5GT
LV RECTIFIER
V10 2526GT
LV RECTIFIER
HV RECTIFIER
V18 1836T
V18 6C4 HV OSC
CHANNEL 2-13
SW ON CONTRAST CONT.
2 AMP
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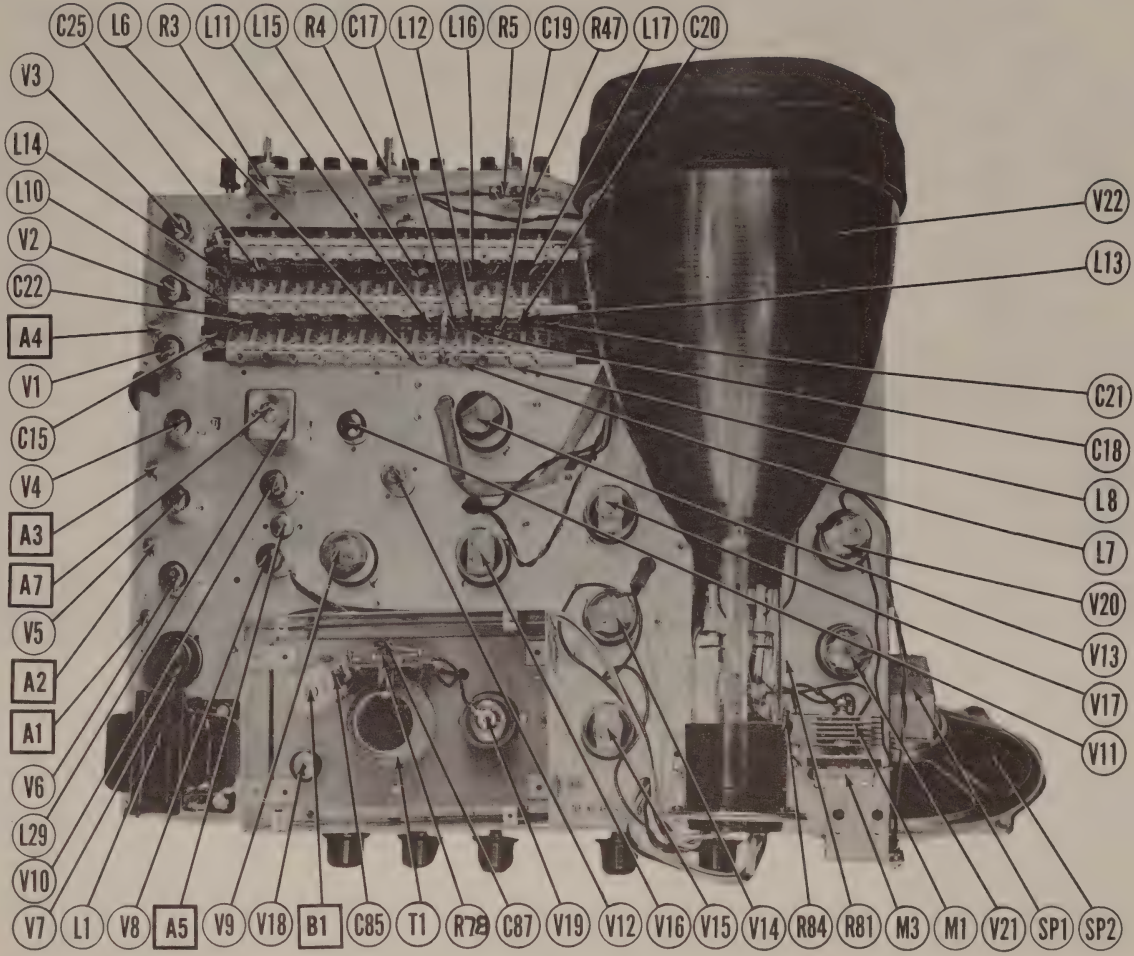
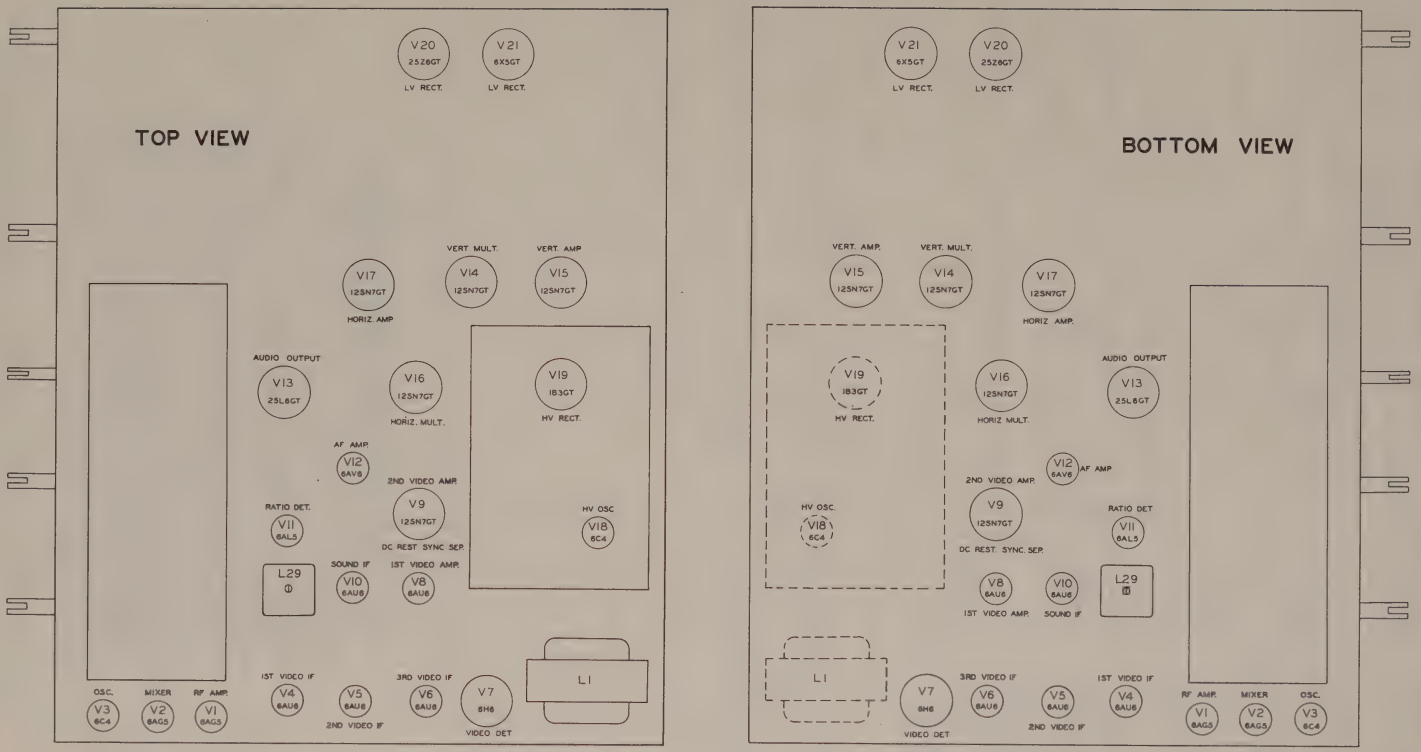
91-6



CHASSIS TOP VIEW

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION


TOP VIEW
V20 25Z6GT LV RECT.
V21 6X5GT LV RECT.
V17 12SN7GT HORIZ. AMP.
VERT. MULT. V14 12SN7GT
VERT. AMP V15 12SN7GT
AUDIO OUTPUT V13 25L6GT
V16 12SN7GT HORIZ. MULT.
V19 1B3GT HV RECT.
AF AMP. V12 6AV6
2ND VIDEO AMP. V9 12SN7GT DC REST. SYNC. SEP.
HV OSC V18 6C4
RATIO DET. V11 6AL5
SOUND IF V10 6AU6
1ST VIDEO AMP. V8 6AU6
L29
L1
OSC. V3 6C4
MIXER V2 6AG5
RF AMP. V1 6AG5
1ST VIDEO IF V4 6AU6
2ND VIDEO IF V5 6AU6
3RD VIDEO IF V6 6AU6
V7 6H6 VIDEO DET
BOTTOM VIEW
V21 6X5GT LV RECT.
V20 25Z6GT LV RECT.
VERT. AMP. V15 12SN7GT
VERT. MULT. V14 12SN7GT
V17 12SN7GT HORIZ. AMP.
V19 1B3GT HV RECT.
V16 12SN7GT HORIZ MULT.
AUDIO OUTPUT V13 25L6GT
V12 6AV6 AF AMP.
2ND VIDEO AMP. V9 12SN7GT DC REST. SYNC. SEP.
HV OSC. V18 6C4
RATIO DET V11 6AL5
V8 6AU6 1ST VIDEO AMP.
V10 6AU6 SOUND IF
L29
L1
V7 6H6 VIDEO DET
3RD VIDEO IF V6 6AU6
V5 6AU6 2ND VIDEO IF
1ST VIDEO IF V4 6AU6
RF AMP. V1 6AG5
MIXER V2 6AG5
OSC. V3 6C4

TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
If the set is to be aligned with the picture tube removed, it will be necessary to short pins 1 and 14 on the picture tube socket to complete the filament circuit.

VIDEO IF ALIGNMENT

Depress one of the pushbuttons lightly to release all the buttons, this will disable the local oscillator tube and prevent erroneous indications.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (Unmod.)	See instructions above	DC Probe to Point Ⓐ. Common to chassis.	A1	Adjust for maximum deflection.
2.	Direct	"	24.7MC	"	"	A2	"
3.	Direct	"	22.9MC	"	"	A3	"
4.	Direct	"	26MC	"	"	A4	"

OVERALL VIDEO IF RESPONSE CHECK

See instructions under Video IF Alignment.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC SWP)	21.75MC 26.25MC	See instructions above.	Vert. Amp. to Point Ⓐ. Low side to chassis.		Check for response curve similar to Fig 1 with markers as shown. If necessary retouch A1 thru A4 for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V7). Low side to chassis.	4.5MC (Unmod.)	Any channel not used locally	DC Probe to Point Ⓑ. Common to chassis.	A5, A6	Adjust for maximum deflection.
7.	.01MFD	"	"	"	DC Probe to Point Ⓒ. Common to chassis.	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep.. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V7). Low side to chassis.	4.5MC (450KC SWP)	4.5MC	Any channel not used locally	Vert. Amp. to Point Ⓑ. Low side to chassis.	A5, A6	Disconnect stabilizer capacitor C6. Adjust for maximum amplitude and symmetry as per Fig 2.
7.	.01MFD	"	"	"	"	Vert. Amp. to Point Ⓒ. Low side to chassis.	A7	Reconnect capacitor C6. Adjust A7 so 4.5MC occurs at center of crossover lines as per Fig 3. Slightly retouch A6 for maximum amplitude and straightness of crossover lines.

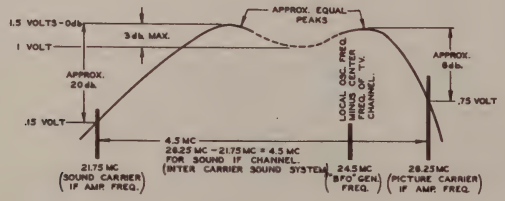

1.5 VOLTS - 0db
1 VOLT
3db MAX.
APPROX. EQUAL PEAKS
APPROX. 20db
.15 VOLT
LOCAL OSC. FREQ MINUS CENTER FREQ. OF TV. CHANNEL.
APPROX. 8db.
.75 VOLT
4.5 MC
28.25 MC - 21.75 MC = 4.5 MC FOR SOUND IF CHANNEL. (INTER CARRIER SOUND SYSTEM)
21.75 MC (SOUND CARRIER IF AMP. FREQ.)
24.5 MC "BFO" GEN. FREQ.
28.25 MC (PICTURE CARRIER IF AMP. FREQ.)

FIG. 1

FIG. 2

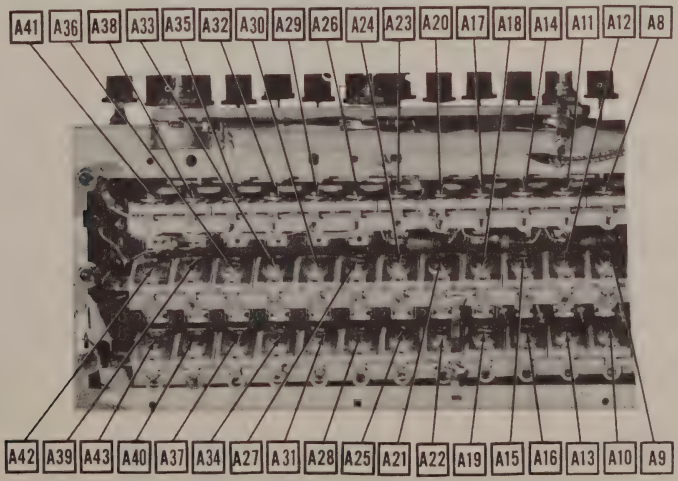
FIG. 3

ALIGNMENT INSTRUCTIONS (CONT.)

RF ALIGNMENT

The local oscillator operates 24.5MC above the center frequency of each TV channel. To set the local oscillator a separate "BFO" set at 24.5MC is used to obtain a zero beat with this difference frequency. Couple the "BFO" generator to the receiver by placing the output lead near the video detector tube (V7). Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	BFO GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	Two 150Ω carbon res.	Across antenna terminals with 150Ω in each lead.	57MC (Unmod.)	24.5MC	2	DC Probe to Point (A). Common to chassis.	A8	Connect a .01MFD capacitor between pin 3 of V9 and pin 4 of V12. Adjust for a rough audio beat note in speaker. Remove the .01MFD capacitor.
9.	"	"	"	Off	2	"	A9, A10	Adjust for maximum deflection.
10.	"	"	63MC	24.5MC	3	"	A11	Reconnect .01MFD capacitor as in step 8. Adjust for beat note. Remove .01MFD cap.
11.	"	"	"	Off	3	"	A12, A13	Adjust for maximum deflection.
12.	"	"	69MC	24.5MC	4	"	A14	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
13.	"	"	"	Off	4	"	A15, A16	Adjust for maximum deflection.
14.	"	"	79MC	24.5MC	5	"	A17	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
15.	"	"	"	Off	5	"	A18, A19	Adjust for maximum deflection.
16.	"	"	85MC	24.5MC	6	"	A20	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
17.	"	"	"	Off	6	"	A21, A22	Adjust for maximum deflection.
18.	"	"	177MC	24.5MC	7	"	A23	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
19.	"	"	"	Off	7	"	A24, A25	Adjust for maximum deflection.
20.	"	"	183MC	24.5MC	8	"	A26	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
21.	"	"	"	Off	8	"	A27, A28	Adjust for maximum deflection.
22.	"	"	189MC	24.5MC	9	"	A29	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
23.	"	"	"	Off	9	"	A30, A31	Adjust for maximum deflection.
24.	"	"	195MC	24.5MC	10	"	A32	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
25.	"	"	"	Off	10	"	A33, A34	Adjust for maximum deflection.
26.	"	"	201MC	24.5MC	11	"	A35	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
27.	"	"	"	Off	11	"	A36, A37	Adjust for maximum deflection.
28.	"	"	207MC	24.5MC	12	"	A38	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
29.	"	"	"	Off	12	"	A39, A40	Adjust for maximum deflection.
30.	"	"	213MC	24.5MC	13	"	A41	Reconnect .01MFD cap as in step 8. Adjust for beat note. Remove .01MFD cap.
31.	"	"	"	Off	13	"	A42, A43	Adjust for maximum deflection.



RF TUNER ALIGNMENT POINTS

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.1VDC	.8VDC	26VAC	19VAC	105VDC	105VDC	.8VDC		
V 2	6AG5	-1.6VDC	0V.	13VAC	19VAC	105VDC	105VDC	0V.		
V 3	6C4	172VDC	0V.	33VAC	26VAC	172VDC	§-7VDC	.1VDC		
V 4	6AU6	-1VDC	0V.	19VAC	25VAC	105VDC	105VDC	0V.		
V 5	6AU6	-.7VDC	0V.	25VAC	32VAC	105VDC	105VDC	0V.		
V 6	6AU6	0V.	0V.	32VAC	38VAC	85VDC	105VDC	.8VDC		
V 7	6H6	0V.	38VAC	0V.	0V.	-2.5VDC	0V.	44VAC	0V.	
V 8	6AU6	0V.	0V.	38VAC	45VAC	95VDC	105VDC	2VDC		
V 9	12SN7GT	19VDC	105VDC	25VDC	0V.	33VDC	2.1VDC	63VAC	49VAC	
V 10	6AU6	-.4VDC	0V.	45VAC	49VAC	20VDC	20VDC	0V.		
V 11	6AL5	0V.	0V.	33VAC	38VAC	.2VDC	0V.	-.2VDC		
V 12	6AV6	0V.	.5VDC	19VAC	13VAC	0V.	0V.	29VDC		
V 13	25L6GT	0V.	75VAC	105VDC	120VDC	0V.	0V.	100VAC	6.1VDC	
V 14	12SN7GT	0V.	55VDC	1.6VDC	-14VDC	80VDC	1.6VDC	55VAC	44VAC	
V 15	12SN7GT	0V.	▲265VDC	▲11VDC	▲0V.	▲340VDC	▲11VDC	75VAC	70VAC	
V 16	12SN7GT	0V.	55VDC	1.6VDC	-4.2VDC	70VDC 80VDC	1.6VDC	75VAC	63VAC	
V 17	12SN7GT	-21VDC	390VDC	12VDC	1.4VDC	380VDC	12VDC	70VAC	55VAC	
V 18	6C4	■230VDC	0V.	106VAC	100VAC	■230VDC	■-32VDC	■.4VDC		
V 19	1B3GT	* DO NOT MEASURE.								
V 20	25Z6GT	260VDC	75VAC	-150VDC	116VAC	125VDC	117VAC	106VAC	260VDC	
V 21	6X5GT	0V.	6.4VAC	260VDC	0V.	260VDC	0V.	0V.	390VDC	

V 22	7JP4	PIN 1	PIN 2	PIN 3	PIN 5	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 14
		6.4VAC	110VDC	2.3VDC	*	*	*	*	*	*	13VAC

§ TAKEN WITH VACUUM TUBE VOLTMETER.
* DO NOT MEASURE.
▲ MEASURED FROM JUNCTION OF R62 AND R80.
■ MEASURED FROM ON-OFF SWITCH.

RESISTANCE READINGS

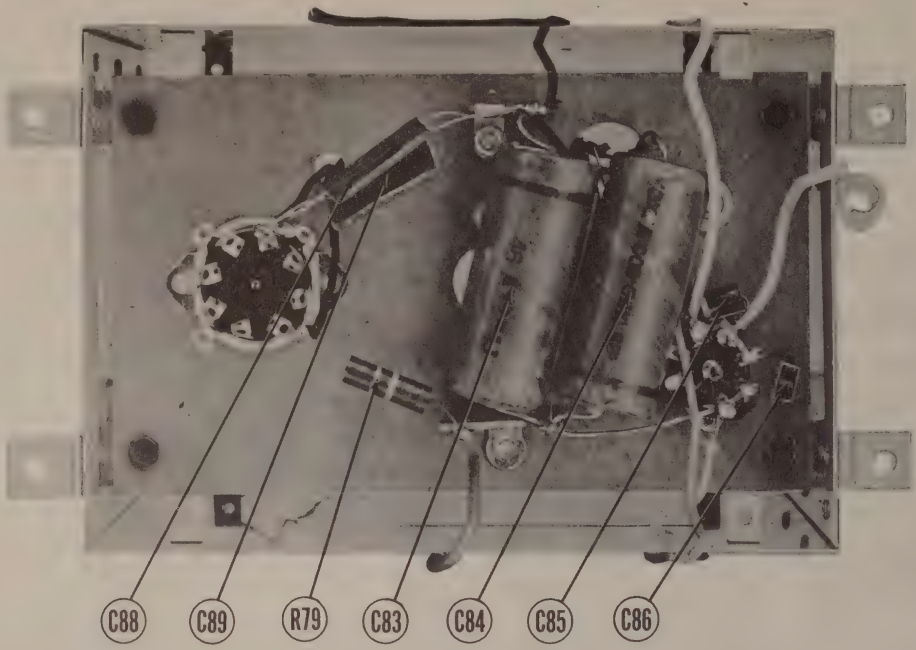
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	1.3 Meg.	150Ω	9Ω	6.5Ω	†260Ω	†360Ω	150Ω		
V 2	6AG5	1 Meg.	0Ω	3.5Ω	6.5Ω	†360Ω	†360Ω	0Ω		
V 3	6C4	#4KΩ	0Ω	13Ω	9Ω	#4KΩ	22KΩ	2.5Ω		
V 4	6AU6	700KΩ	0Ω	6.5Ω	9Ω	†260Ω	†260Ω	0Ω		
V 5	6AU6	600KΩ	0Ω	9Ω	12Ω	†160Ω	†160Ω	0Ω		
V 6	6AU6	18KΩ	0Ω	12Ω	14Ω	†6.8KΩ	†60Ω	100Ω		
V 7	6H6	0Ω	15Ω	Inf.	0Ω	5.6KΩ	560KΩ	18Ω	.1Ω	
V 8	6AU6	1 Meg.	0Ω	14Ω	15Ω	†8.2KΩ	†60Ω	1000Ω		
V 9	12SN7GT	250KΩ	†60Ω	6.8KΩ	330KΩ	†30KΩ	33KΩ	20Ω	17Ω	
V 10	6AU6	150KΩ	0Ω	16Ω	17Ω	†15KΩ	†15KΩ	0Ω		
V 11	6AL5	Inf.	Inf.	13Ω	15Ω	10KΩ	0Ω	10KΩ		
V 12	6AV6	13Ω	150Ω	6.5Ω	3.5Ω	0Ω	0Ω	†470KΩ		
V 13	25L6GT	Inf.	23Ω	†280Ω	†60Ω	470KΩ	Inf.	25Ω	100Ω	
V 14	12SN7GT	5KΩ	♦150KΩ	680Ω	1 Meg.	♦1.4 Meg.	680Ω	22Ω	18Ω	
V 15	12SN7GT	▲150KΩ	♦100KΩ	▲2.7KΩ	▲2.5Meg. ▲60Ω	♦100KΩ	▲2.7KΩ	25Ω	24Ω	
V 16	12SN7GT	32Ω	♦150KΩ	680Ω	800KΩ	♦1.5Meg. ♦900KΩ	680Ω	23Ω	20Ω	
V 17	12SN7GT	10 Meg.	♦150Ω	1000Ω	1.5 Meg.	♦150Ω	1000Ω	24Ω	22Ω	
V 18	6C4	#670Ω	Inf.	26Ω	25Ω	#670Ω	▲5.6KΩ	▲60Ω		
V 19	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP 460Ω
V 20	25Z6GT	60KΩ	25Ω	160KΩ	64Ω	10KΩ	46Ω	26Ω	60KΩ	
V 21	6X5GT	Inf.	2Ω	60KΩ	Inf.	60KΩ	Inf.	0Ω	70KΩ	

V 22	7JP4	PIN 1	PIN 2	PIN 3	PIN 5	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 14
		2Ω	470KΩ	33KΩ	¶20Meg.	¶6.5Meg. ¶5 Meg.	¶6.5Meg.	¶0Ω	¶7.5Meg.	¶6.8Meg	3.5Ω

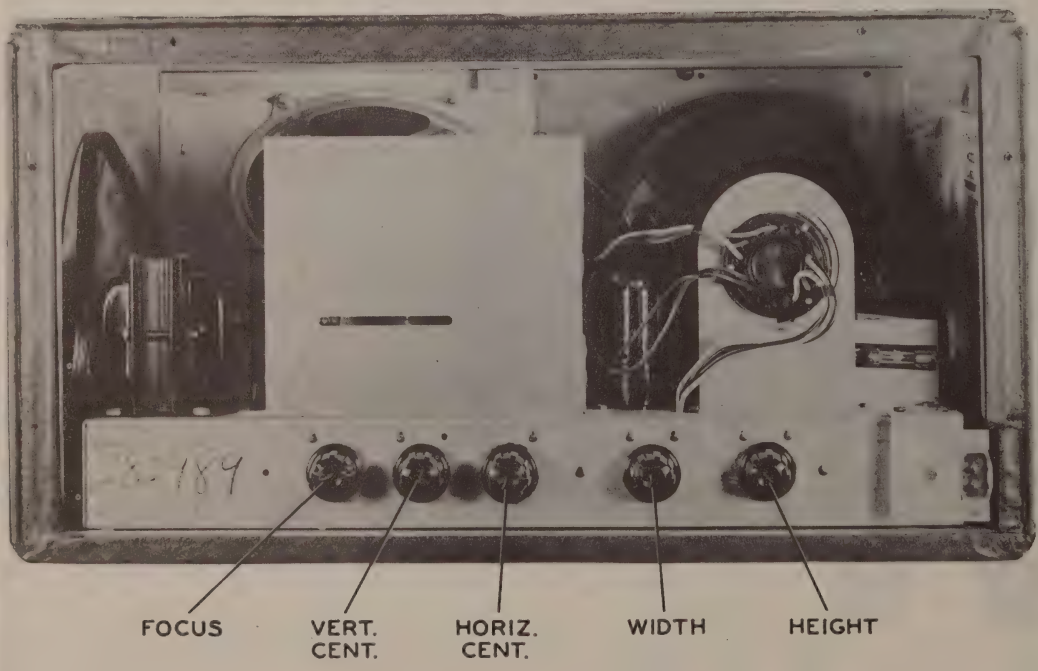
▲ MEASURED FROM JUNCTION OF R62 AND R80.
¶ MEASURED FROM PIN 7 OF V19.
† MEASURED FROM PIN 5 OF V20.
# MEASURED FROM PIN 8 OF V20.
♦ MEASURED FROM PIN 8 OF V21.
▬ MEASURED FROM PIN 4 OF V20.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

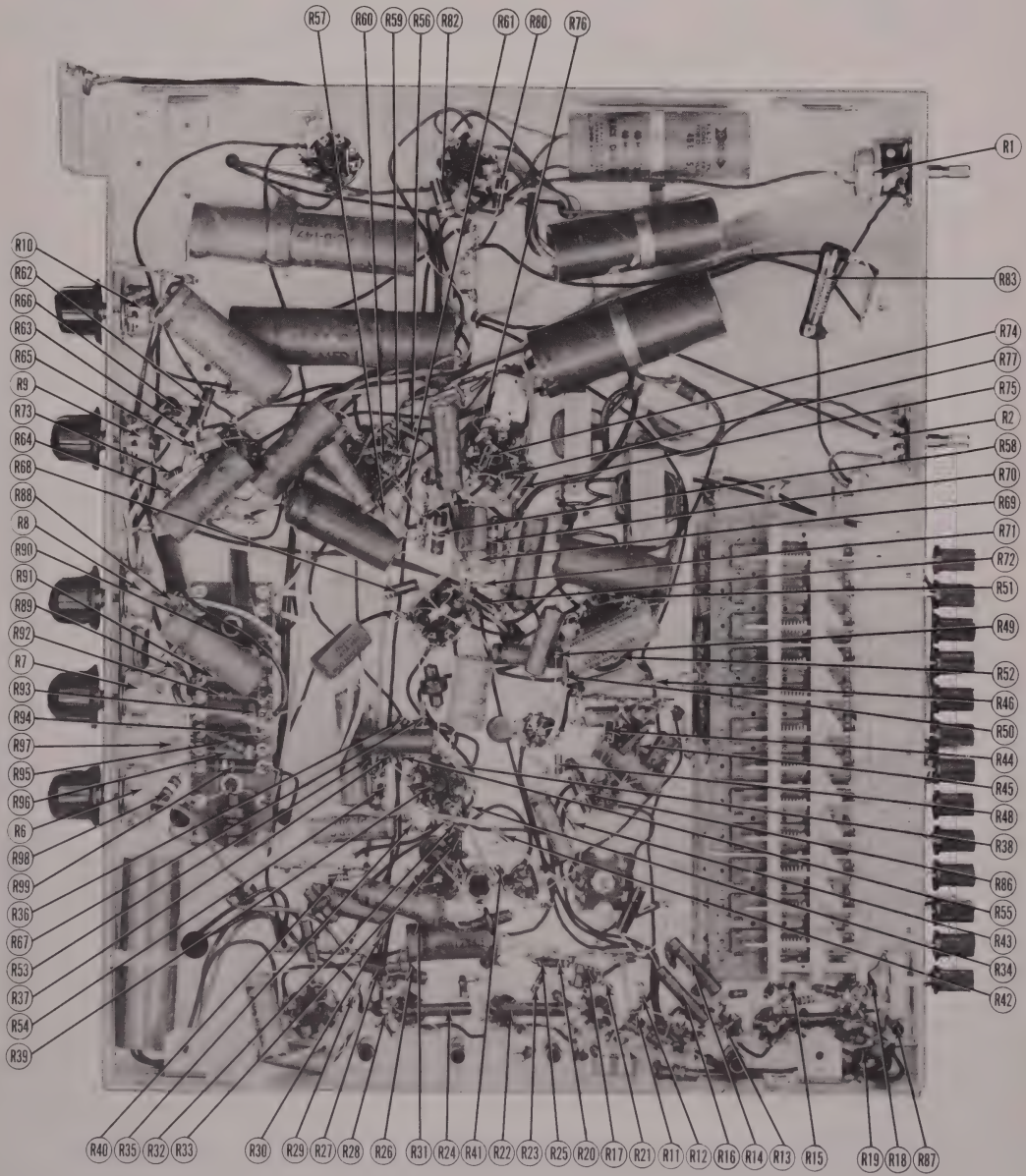


HIGH VOLTAGE SUPPLY-BOTTOM VIEW



CABINET-REAR VIEW

CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

HIGH VOLTAGE OSCILLATOR ADJUSTMENT

Connect a 50 Meg. bleeder, consisting of five 10 Meg. resistors, in series with a 0-150 microampere meter across the the high voltage filter capacitor C90. Adjust the high voltage oscillator trimmer (B1) to read 95 microamperes with the trimmer on the high capacity side of maximum current.

HORIZONTAL WIDTH AND LINEARITY ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

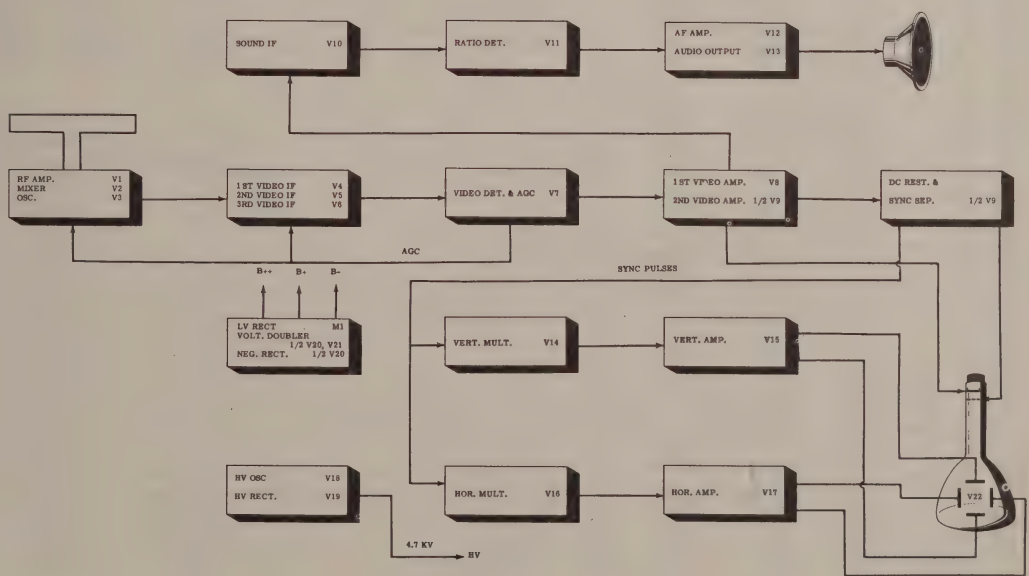
Turn the horizontal and vertical hold controls to synchronize the picture.

Adjust the width control until the picture fills the mask horizontally. Adjust the horizontal linearity trimmer (B2) until the picture fills the mask horizontally.

Due to interaction between B2 and the width control, it may be necessary to repeat the adjustments for optimum results.

DISASSEMBLY INSTRUCTIONS

1. Remove five push-on type control knobs.
2. Remove ten screws holding rear cover. Remove cover.
3. Remove speaker plug.
4. Remove four screws holding chassis. Remove chassis.
5. Remove four 11/32" hex nuts holding speaker. Remove speaker.



BLOCK DIAGRAM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6AG5	6AG5	7BD
V2	Mixer		6AG5	6AG5	7BD
V3	Oscillator		6C4	6C4	6BG
V4	1st Video IF		6AU6	6AU6	7BK
V5	2nd Video IF		6AU6	6AU6	7BK
V6	3rd Video IF		6AU6	6AU6	7BK
V7	Video Det. & AGC		6H6	6H6	7Q
V8	1st Video Amp.		6AU6	6AU6	7BK
V9	2nd Video Amp. - DC Restorer-Sync. Sep.		12SN7GT	12SN7GT	8BD
V10	Sound IF Amp.		6AU6	6AU6	7BK
V11	Ratio Det.		6AL5	6AL5	6BT
V12	AF Amp.		6AV6	6AV6	7BT
V13	Audio Output		25L6GT	25L6GT	7AC
V14	Vert. Multivibrator		12SN7GT	12SN7GT	8BD
V15	Vert. Amp.		12SN7GT	12SN7GT	8BD
V16	Hor. Multivibrator		12SN7GT	12SN7GT	8BD
V17	Hor. Amp.		12SN7GT	12SN7GT	8BD
V18	HV Oscillator		6C4	6C4	6BG
V19	HV Rectifier		1B3GT	1B3GT	3C
V20	LV Rectifier		25Z6GT	25Z6GT	7Q
V21	LV Rectifier		6X5GT	6X5GT	6S
V22	Picture Tube		7JP4	7JP4	14G

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Hallicrafters PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	300	45B125	PRSA88G		TVL-64♦	Filter-Red
B	40	300					Filter-Red
C2A	30	450	45B126	PRSA6J12G		TVL-30	Filter-Red
B	60	300				⋕	Filter-Yellow
C3A	100	150	45B124	PRSA2020D			Filter-Red
B	100	150					Filter-Red
C4A	30	200	45B123	PRS250/40		EL-245 ♦	Filter-Red-Black
B	30	200		PRS250/40			Filter-Yellow-Blue
C5	10	25	45A121	PRS25/10		TVA-5	Output Cathode Bypass
C6	5	50	45A109	PRS150/4		TVA-13	Stabilizing Cap.
C7	5	50	45A109	PRS150/4		TVA-13	DC Res. Cathode Bypass
C8	1000		47B20A102N1	GP1000M	GP2L-001		Ant. Coupling
C9	1000		47B20A102N1	GP1000M	GP2L-001		Ant. Coupling
C10	47		47B20470K5	GP47M	GP1K-47		RF Coupling
C11	47		47B20470K5	GP47M	GP1K-47		RF Coupling
C12	1000		47B20A102N1	GP1000M	GP2L-001		AGC Filter
C13	1000		47B20A102N1	GP1000M	GP2L-001		RF Screen Bypass
C14	1000		47B20A102N1	GP1000M	GP2L-001		RF Filament Bypass
C15	1.5		47A160-3	CN1.5CNPO	NPOK-1.5		RF Coupling
C16	39		47B20390K5	GP39K	GP1K-39		RF Coupling
C17	2.2		47A160-4				RF Coupling
C18	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		RF Coupling
C19	3.3		47A160-5	CN3.3CNPO	NPOK-3.3		RF Coupling
C20	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		RF Coupling
C21	3.3		47A160-5	CN3.3CNPO	NPOK-3.3		RF Coupling
C22	39		47B20390K5	GP39K	GP1K-39		RF Coupling
C23	1.5		47A160-3	CN1.5CNPO	NPOK-1.5		RF Coupling *
C24	1000		47B20A102N1	GP1000M	GP2L-001		Conv. Filament Bypass
C25	39		47B20390K5	GP39K	GP1K-39		Osc. Grid Cap.
C26	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		Fixed Trimmer
C27	.68		47A160-1				Osc. Coupling
C28	1000		47B20A102N1	GP1000M	GP2L-001		Osc. Plate Bypass
C29	1000		47B20A102N1	GP1000M	GP2L-001		RF Bypass
C30	1000		47B20A102N1	GP1000M	GP2L-001		Conv. Decoupling
C31	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Filament Bypass
C32	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Filament Bypass
C33	50		47B20500K5	GP50M	GP1K-50	1FM-45	IF Coupling
C34	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	AGC Filter
C35	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Decoupling
C36	50		47B20500K5	GP50M	GP1K-50	1FM-45	IF Coupling
C37	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Fil. Bypass
C38	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Fil. Bypass
C39	.25	200	46AT254J	P488-25		TC-2	AGC Filter
C40	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	AGC Filter
C41	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	2nd V. IF Decoupling
C42	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	2nd V. IF Fil. Bypass
C43	50		47B20500K5	GP50M	GP1K-50	1FM-45	IF Coupling
C44	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	3rd V. IF Cathode Bypass
C45	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	3rd V. IF Decoupling
C46	100		47B20100K5	GP100M	GP1K-100	1FM-31	IF Coupling
C47	10		47A160-11	GP10K	GP1K-10	MS-41	V. Diode Filter
C48	.05	200	46AU503J	P288-05		TM-15	AGC Filter
C49	.1	200	46AU104J	P288-1		TM-1	V. Det. Filament Bypass
C50	.1	200	46AU104J	P288-1		TM-1	Video Coupling
C51	.1	200	46AU104J	P288-1		TM-1	Video Coupling
C52	.1	200	46AU104J	P288-1		TM-1	Video Coupling
C53	.25	200	46AT254J	P488-25		TC-2	Video Coupling
C54	100		47B20100K5	GP100M	GP1K-100	1FM-31	DC Res. Grid Bypass
C55	1		47A160-2		NPOK-1.5		S. IF Coupling
C56	100		47B20100K5	GP100M	GP1K-100	1FM-31	S. IF Coupling
C57	.02	200	46AU203J	P488-02		TM-12	S. IF Decoupling
C58	330	500	47B0331K5	1468-00035	GP2K-330	1FM-335	Diode Load Cap. §
C59	330	500	47B0331K5	1468-00035	GP2K-330	1FM-335	Diode Load Cap. §
C60	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	De-emphasis
C61	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Ratio Det. Fil. Bypass
C62	.02	200	46AU203J	P488-02		TM-12	Audio Coupling
C63	5000		47A168	BPD-5	811-005	29C1	AF Amp. Fil. Bypass
C64	.01	400	46AU103J	P488-01	821-01	TM-11	Audio Coupling
C65	.02	200	46AU203J	P488-02		TM-12	Output Plate Bypass

CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT: Hallicrafters PART No.	REPLACEMENT: AEROVOX PART No.	REPLACEMENT: PA
C66	.05	200	46AU503J	P288-05	
C67	.005	200	46AU502J	P688-005	811-005
C68	.25	600	46AX254J	684-25	
C69	.01	600	46AZ103J	P688-01	821-01
C70	.1	600	46AY104J	P688-1	
C71	.25	600	46AX254J	684-25	
C72	.1	600	46AY104J	P688-1	
C73	.03	6000	46AB149	6089M-03	
C74	.03	6000	46AB149	6089M-03	
C75	.25	600	46AX254J	684-25	
C76	100		47B20100K5	GP100M	GP1K-
C77	100		47B20100K5	GP100M	GP1K-
C78	680	500	47X20A681M	1468-00075	GP2K-
C79	3.3		47A160-5	CN3.3CNPO	NPOK
C80	500	5000	47A190	5084-0005	
C81	500	5000	47A190	5084-0005	
C82	.1	600	46AY104J	P688-1	
C83	.25	600	46AX254J	684-25	
C84	.25	600	46AX254J	684-25	
C85	220	500		1469-0002	GP2K-
C86	4.7		47A160-6	CN4.7DNPO	NPOK
C87	1000		47B20A102N1	GP1000M	GP2L-
C88	500	5000	47A190		
C89	500	5000	47A190		
C90	500	5000	47A190	5084-0005	
C91	500	5000	47A190	5084-0005	
C92	1000		47B20A102N1	GP1000M	GP2L-
C93	.1	200	46AU104J	P288-1	
C94	.02	600		P688-02	

* Not used in all models.
† Some models use .001MFD (MFGR'S Part no. 46A146) f
‡ Some models use .001MFD (MFGR'S Part no. 46A146) f
§ When either item C58 or C59 are replaced, replace bot
♦ Use mounting strap.
Parallel sections to obtain desired capacity.

CO

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT DATA: Hallicrafters PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAR PAR
R1	1000Ω	2	25B739		
R2A	25KΩ	½	25B722	Q11-120	AM-4
B	Shaft		Not Req.	Not Req.	KSS-3
R3A	1 Meg.	½	25B721	Q13-137	AM-6
B	Shaft		Not Req.	Not Req.	KSS-3
R4A	500KΩ	½	25B720	Q11-133	AM-5
B	Shaft		Not Req.	Not Req.	KSS-3
R5A	500KΩ	½	25B720	Q11-133	AM-5
B	Shaft		Not Req.	Not Req.	KSS-3
R6A	5 Meg.	½	25B723	Q11-141	AM-8
B	Shaft		Not Req.	Not Req.	KSS-3
R7A	5 Meg.	½	25B723	Q11-141	AM-8
B	Shaft		Not Req.	Not Req.	KSS-3
R8A	5 Meg.	½	25B723	Q11-141	AM-8
B	Shaft		Not Req.	Not Req.	KSS-3
R9A	2.5 Meg.	½	25B724	Q11-239	AM-8
B	Shaft		Not Req.	Not Req.	KSS-3
R10A	2.5 Meg.	½	25B724	Q11-239	AM-8
B	Shaft		Not Req.	Not Req.	KSS-3

RE

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTER PART No.	REPLACEMENT DATA: IRC PART No.
R11	150Ω	½	23X20X151M	
R12	2.2 Meg.10%	½	23X20X225M	BTS-2.2 Meg
R13	150Ω	½	23X20X151M	
R14	100Ω	1	23X20X101M	BW-1-100
R15	1 Meg.	½	23X20X105M	
R16	100Ω	1	23X20X101M	BW-1-100
R17	2.2 Meg.10%	½	23X20X225M	BTS-2.2 Meg
R18	22KΩ10%	½	23X20X223M	
R19	100Ω	1	23X20X101M	BW-1-100
R20	120KΩ10%	½	23X20X124K	BTS-120K
R21	18KΩ10%	½	23X20X183K	
R22	100Ω	1	23X20X101M	BW-1-100
R23	12KΩ10%	½	23X20X123K	
R24	100Ω	1	23X20X101M	BW-1-100
R25	120KΩ10%	½	23X20X124K	BTS-120K
R26	18KΩ10%	½	23X20X183K	
R27	100Ω	1	23X20X101M	BW-1-100
R28	6800Ω	½	23X20X682M	BTS-6800
R29	560KΩ10%	½	23X20X564M	BTS-560K
R30	5600Ω10%	½	23X20X562K	BTS-5600
R31	1 Meg.	½	23X20X105M	BTS-1 Meg.
R32	8200Ω	½	23X20X822M	BTS-8200
R33	1 Meg.	½	23X20X105M	BTS-1 Meg.
R34	330KΩ10%	½	23X20X334M	BTS-330K
R35	6800Ω	½	23X20X682M	BTS-6800
R36	330KΩ10%	½	23X20X334M	BTS-330K
R37	5600Ω10%	½	23X20X562K	BTS-5600
R38	33KΩ	½	23X20X333M	BTS-33K
R39	82KΩ10%	½	23X20X823M	BTS-82K
R40	470KΩ10%	½	23X20X474M	BTS-470K
R41	150KΩ	½	23X20X154M	
R42	33KΩ	½	23X20X333M	BTS-33K

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTER Part No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6C4	6C4	5BG	
V4	1st Video IF	6AU6	6AU6	7BK	
V5	2nd Video IF	6AU6	6AU6	7BK	
V6	3rd Video IF	6AU6	6AU6	7BK	
V7	Video Det. & AGC	6H6	6H6	7Q	
V8	1st Video Amp	6AU6	6AU6	7BK	
V9	2nd Video Amp. - DC Restorer - Sync. Sep.	12SN7GT	12SN7GT	8BD	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Det.	6AL5	6AL5	6BT	
V12	AF Amp.	6AV6	6AV6	7BT	
V13	Audio Output	25L6GT	7AC	14G	
V14	Vert. Multivibrator	12SN7GT	12SN7GT	8BD	
V15	Vert. Amp.	12SN7GT	12SN7GT	8BD	
V16	Hor. Multivibrator	12SN7GT	12SN7GT	8BD	
V17	Hor. Amp.	12SN7GT	12SN7GT	8BD	
V18	HV Oscillator	6C4	6C4	5BG	
V19	HV Rectifier	1B3GT	1B3GT	3C	
V20	LV Rectifier	25Z5GT	25Z6GT	7Q	
V21	LV Rectifier	6X5GT	6X5GT	6R	
V22	Picture Tube	17P4	17P4	14G	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Hallicrafters Part No.	REPLACEMENT DATA: AEROVOX Part No.	REPLACEMENT DATA: ERIE Part No.	REPLACEMENT DATA: SPRAGUE Part No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	300	45B125	PRSA88G		TVL-64+	Filter-Red
B	40	300					Filter-Red
C2A	30	450	45B126	PRSA6J3G		TVL-30	Filter-Red
B	60	300				#9	Filter-Yellow
C3A	100	150	45B124	PRSA2020D			Filter-Red
B	100	150					Filter-Red
C4A	30	200	45B123	PRS250/40		EL-245 +	Filter-Red-Black
B	30	200		PRS250/40			Filter-Yellow-Blue
C5	10	25	45A121	PRS25/10		TVA-5	Output Cathode Bypass
C6	5	50	45A109	PRS150/4		TVA-13	Stabilizing Cap.
C7	5	50	45A109	PRS150/4		TVA-13	DC Res. Cathode Bypass
C8	1000		47B20A102N1	GP1000M	GP2L-001		Ant. Coupling
C9	1000		47B20A102N1	GP1000M	GP2L-001		Ant. Coupling
C10	47		47B20470K5	GP47M	GP1K-47		RF Coupling
C11	47		47B20470K5	GP47M	GP1K-47		RF Coupling
C12	1000		47B20A102N1	GP1000M	GP2L-001		AGC Filter
C13	1000		47B20A102N1	GP1000M	GP2L-001		RF Screen Bypass
C14	1000		47B20A102N1	GP1000M	GP2L-001		RF Filament Bypass
C15	1.5		47A160-5	CN1.5CNPO	NPOK-1.5		RF Coupling
C16	39		47B30390K5	GP39K	GP1K-39		RF Coupling
C17	2.2		47A160-4				RF Coupling
C18	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		RF Coupling
C19	3.3		47A160-5	CN3.3CNPO	NPOK-3.3		RF Coupling
C20	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		RF Coupling
C21	3.3		47A160-5	CN3.3CNPO	NPOK-3.3		RF Coupling
C22	39		47B30390K5	GP39K	GP1K-39		RF Coupling
C23	1.5		47A160-3	CN1.5CNPO	NPOK-1.5		RF Coupling *
C24	1000		47B20A102N1	GP1000M	GP2L-001		Conv. Filament Bypass
C25	39		47B30390K5	GP39K	GP1K-39		Osc. Grid Cap.
C26	4.7		47A160-6	CN4.7DNPO	NPOK-4.7		Fixed Trimmer
C27	.68		47A160-1				Osc. Coupling
C28	1000		47B20A102N1	GP1000M	GP2L-001		Osc. Plate Bypass
C29	1000		47B20A102N1	GP1000M	GP2L-001		RF Bypass
C30	1000		47B20A102N1	GP1000M	GP2L-001		Conv. Decoupling
C31	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Filament Bypass
C32	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Filament Bypass
C33	50		47B20505K5	GP50M	GP1K-50	1FM-45	IF Coupling
C34	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	AGC Filter
C35	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Decoupling
C36	50		47B20505K5	GP50M	GP1K-50	1FM-45	IF Coupling
C37	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Fil. Bypass
C38	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	1st V. IF Fil. Bypass
C39	.25	200	46A T254J	P488-25		TC-3	AGC Filter
C40	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	AGC Filter
C41	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	2nd V. IF Decoupling
C42	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	2nd V. IF Fil. Bypass
C43	50		47B20505K5	GP50M	GP1K-50	1FM-45	IF Coupling
C44	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	3rd V. IF Cathode Bypass
C45	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	3rd V. IF Decoupling
C46	100		47B20100K5	GP100M	GP1K-100	1FM-31	IF Coupling
C47	10		47A160-11		GP10K	MS-41	V. Diode Filter
C48	.05	200	46A U503J	P388-05		TM-15	AGC Filter
C49	.1	200	46A U104J	P388-1		TM-1	V. Det. Filament Bypass
C50	.1	200	46A U104J	P388-1		TM-1	Video Coupling
C51	.1	200	46A U104J	P388-1		TM-1	Video Coupling
C52	.1	200	46A U104J	P388-1		TM-1	Video Coupling
C53	.25	200	46A T254J	P488-25		TC-3	Video Coupling
C54	100		47B20100K5	GP100M	GP1K-100	1FM-31	DC Res. Grid Bypass
C55	8		47A160-3		NPOK-1.5		S. IF Coupling
C56	100		47B20100K5	GP100M	GP1K-100	1FM-31	S. IF Coupling
C57	.02	200	46A U203J	P488-02		TM-12	S. IF Decoupling
C58	330	500	47B0331K5	1468-00035	GP2K-330	1FM-325	Diode Load Cap. §
C59	330	500	47B0331K5	1468-00035	GP2K-330	1FM-325	Diode Load Cap. §
C60	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	De-emphasis
C61	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Ratio Det. Fil. Bypass
C62	.02	200	46A U203J	P488-02		TM-12	Audio Coupling
C63	5000		47A168	BPD-5	811-005	29C1	AF Amp. Fil. Bypass
C64	.01	400	46A U103J	P488-01	821-01	TM-11	Audio Coupling
C65	.02	200	46A U203J	P488-02		TM-12	Output Plate Bypass

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Hallicrafters Part No.	REPLACEMENT DATA: AEROVOX Part No.	REPLACEMENT DATA: ERIE Part No.	REPLACEMENT DATA: SPRAGUE Part No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C66	.05	200	46A U503J	P288-05		TM-15	Sync. Coupling
C67	.005	200	46A U502J	P688-005	811-005	TM-25	Integrator Net.
C68	.25	600	46A X254J	684-25		TC-2	Vert. MV Decoupling
C69	.01	600	46A Z103J	P688-01	821-01	TM-11	Vert. MV Feedback
C70	.1	600	46A Y104J	P688-1		TM-1	Vert. Discharge
C71	.25	600	46A X254J	684-25		TC-2	Vert. Sweep Coupling
C72	.1	600	46A Y104J	P688-1		TM-1	Vert. Sweep Coupling
C73	.03	6000	46A B149	6089M-03			Vert. Sweep Coupling
C74	.03	6000	46A B149	6089M-03			Vert. Sweep Coupling
C75	.25	600	46A X254J	684-25		TC-2	Hor. MV Decoupling
C76	100		47B20100K5	GP100M	GP1K-100	1FM-31	Hor. MV Feedback
C77	47		47B20100K5	GP100M	GP1K-100	1FM-31	Hor. Discharge
C78	680	500	47X20A681M	1468-00075	GP2K-680	1FM-37	Hor. Sweep Coupling
C79	3.3		47A160-5	CN3.3CNPO	NPOK-3.3		Hor. Feedback
C80	500	5000	47A190	5084-0005		TVM-356	Hor. Sweep Coupling
C81	500	5000	47A190	5084-0005		TVM-356	Hor. Sweep Coupling
C82	.1	600	46A Y104J	P688-1		TM-1	Cent. Cont. Bypass
C83	.25	600	46A X254J	684-25		TC-2	Line Filter
C84	.25	600	46A X254J	684-25		TC-2	HV Osc. Decoupling
C85	220	500		1469-0002	GP2K-220	MS-32	Fixed Trimmer *
C86	4.7		47A160-6	CN4.7DNPO	NPOK-4.7	MS-55	HV Osc. Feedback
C87	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	HV Osc. Grid Cap.
C88	500	5000	47A190				HV Filter †
C89	500	5000	47A190				HV Filter †
C90	500	5000	47A190	5084-0005		TVM-356	HV Filter †
C91	500	5000	47A190	5084-0005		TVM-356	HV Filter †
C92	1000		47B20A102N1	GP1000M	GP2L-001	1FM-21	Rect. Fil. Bypass
C93	.1	200	46A U104J	P288-1		TM-1	Filament Bypass
C94	.02	200		P688-02		TM-12	Hor. MV Decoupling *

* Not used in all models.
† Some models use .001MFD (MFGR'S Part no. 46A146) for items C88 and C89.
† Some models use .001MFD (MFGR'S Part no. 46A146) for items C90 and C91.
§ When either item C58 or C59 are replaced, replace both with capacitors of equal value.
◆ Use mounting strap.
Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Hallicrafters Part No.	REPLACEMENT DATA: IRC Part No.	REPLACEMENT DATA: CLAROSTAT Part No.	INSTALLATION NOTES
R1	1000Ω	2	25B739			Contrast control and switch-Wire Wound
R2A	250Ω	½	25B722	Q11-120	AM-40-S	Brightness control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions
R3A	1 Meg.	½	25B721	Q13-137	AM-63-Z	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R3A per instructions
R4A	500KΩ	½	25B720	Q11-133	AM-58-S	Horiz. hold control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R4A per instructions
R5A	500KΩ	½	25B720	Q11-133	AM-58-S	Vert. hold control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R5A per instructions
R6A	5 Meg.	½	25B723	Q11-141	AM-65-S	Focus control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R6A per instructions
R7A	5 Meg.	½	25B723	Q11-141	AM-65-S	Vert. centering control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R7A per instructions
R8A	5 Meg.	½	25B723	Q11-141	AM-65-S	Horiz. centering control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R8A per instructions
R9A	2.5 Meg.	½	25B724	Q11-239	AM-64-S	Width control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R9A per instructions
R10A	2.5 Meg.	½	25B724	Q11-239	AM-64-S	Height control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R10A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTERS Part No.	REPLACEMENT DATA: IRC Part No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 20% UNLESS OTHERWISE STATED.
R11	150Ω	½	23X20X151M		RF Grid
R12	2.2 Meg. 10%	1	23X20X225M	BTS-2.2 Meg.	AGC Network
R13	150Ω	½	23X20X151M		RF Cathode
R14	100Ω	1	23X20X101M	BW-1-100	RF Screen Decoupling-Wire Wound
R15	1 Meg.	½	23X20X105M		Mixer Grid
R16	100Ω	1	23X20X101M	BW-1-100	Mixer Decoupling-Wire Wound
R17	2.2 Meg. 10%	½	23X20X225M	BTS-2.2 Meg.	AGC Network
R18	22KΩ 10%	½	23X20X223M		Osc. Grid
R19	100Ω	1	23X20X101M	BW-1-100	Osc. Plate-Wire Wound
R20	120KΩ 10%	½	23X20X124K	BTS-120K	AGC Network
R21	18KΩ 10%	½	23X20X183K		1st Video IF Grid
R22	100Ω	1	23X20X101M	BW-1-100	1st Video IF Decoupling-Wire Wound
R23	12KΩ 10%	½	23X20X123K		2nd Video IF Grid
R24	100Ω	1	23X20X101M	BW-1-100	2nd Video IF Decoupling-Wire Wound
R25	120KΩ 10%	½	23X20X124K	BTS-120K	AGC Network
R26	18KΩ 10%	½	23X20X183K		3rd Video IF Grid
R27	100Ω	1	23X20X101M	BW-1-100	3rd Video IF Cathode-Wire Wound
R28	6800Ω	½	23X20X682M	BTS-6800	3rd Video IF Plate
R29	560KΩ 10%	½	23X20X564M	BTS-560K	AGC Network
R30	5600Ω 10%	½	23X20X562K	BTS-5600	Video Det. Diode Load
R31	1 Meg.	½	23X20X105M	BTS-1 Meg.	1st Video Amp. Grid
R32	8200Ω	½	23X20X822M	BTS-8200	1st Video Amp. Plate
R33	1 Meg.	½	23X20X105M	BTS-1 Meg.	Voltage Divider
R34	330KΩ 10%	½	23X20X334M	BTS-330K	2nd Video Amp. Grid
R35	6800Ω	½	23X20X682M	BTS-6800	2nd Video Amp. Cathode
R36	330KΩ 10%	½	23X20X334M	BTS-330K	Sync. Sep. Grid
R37	5600Ω 10%	½	23X20X562K	BTS-5600	Sync. Sep. Grid
R38	33KΩ	½	23X20X333M	BTS-33K	DC Rest. Cathode
R39	82KΩ 10%	½	23X20X823M	BTS-82K	DC Rest. Plate
R40	470KΩ 10%	½	23X20X474M	BTS-470K	Voltage Divider
R41	150KΩ	½	23X20X154M		Sound IF Grid
R42	33KΩ	½	23X20X333M	BTS-33K	Sound IF Decoupling

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTERS Part No.	REPLACEMENT DATA: IRC Part No.	IDENTIFICATION CODES
R43	12KΩ 10%	½	23X20X123K	BTS-12K	Voltage Divider
R44	10KΩ 5%	½	23X20X103J	BTS-10K-5%	Ratio Det. Diode Load
R45	10KΩ 5%	½	23X20X103J	BTS-10K-5%	Ratio Det. Diode Load
R46	33KΩ	½	23X20X333M	BTS-33K	De-emphasis
R47	220KΩ 10%	½	23X20X224K	BTS-220K	Isolation
R48	150Ω	2	23X20X151M	BW-1-150	AF Cathode
R49	470KΩ 10%	½	23X20X474K	BTS-470K	AF Plate
R50	33KΩ	½	23X20X333M	BTS-33K	Video Divider
R51	470KΩ 10%	½	23X20X474K	BTS-470K	Output Grid
R52	100Ω	1	23X30X101M	BW-1-100	Output Cathode
R53	33KΩ	½	23X20X333M	BTS-33K	Integrator
R54	470KΩ	½	23X20X472M	BTS-4700	Integrator
R55	470Ω 10%	½	23X20X471K	BTS-470	Voltage Divider
R56	680Ω	1	23X30X681M	BTA-680	Vert. MV Cathode
R57	47KΩ	1	23X30X473M	BTA-47K	Vert. MV Plate
R58	100KΩ 10%	1	23X30X104M	BTA-100K	Vert. MV Plate Decoupling
R59	560KΩ 10%	½	23X20X564K	BTS-560K	Vert. MV Grid
R60	680KΩ 10%	½	23X20X684K	BTS-680K	Vert. MV Plate-See Note 1
R61	680KΩ 10%	½	23X20X684K	BTS-680K	Vert. MV Plate-See Note 1
R62	2700Ω 10%	1	23X30X272K	BTA-2700	Vert. Amp. Cathode
R63	150KΩ	½	23X20X154M	BTS-150K	Vert. Amp. Grid
R64	2.2 Meg. 10%	½	23X20X225K	BTS-2.2 Meg.	Voltage Divider
R65	100KΩ 10%	1	23X30X104M	BTA-100K	Vert. Amp. Plate
R66	100KΩ	1	23X30X104M	BTA-100K	Vert. Amp. Plate
R67	33KΩ	½	23X20X333M	BTS-33K	Horiz. MV Grid
R68	680Ω	1	23X30X681M	BTA-680	Horiz. MV Cathode
R69	47KΩ	1	23X30X473M	BTA-47K	Horiz. MV Plate
R70	100KΩ 10%	1	23X30X104M	BTA-100K	Horiz. MV Plate Decoupling
R71	270KΩ	½	23X20X274M	BTS-270K	Horiz. MV Grid
R72	1 Meg.	½	23X20X105M	BTS-1 Meg.	Horiz. MV Plate
R73	220KΩ 10%	½	23X20X224K	BTS-220K	Voltage Divider
R74	10 Meg.	½	23X20X106M	BTS-10 Meg.	Horiz. Amp. Grid
R75	1000Ω 10%	1	23X30X102K	BTA-1000	Horiz. Amp. Cathode
R76	1.5 Meg.	½	23X20X155M	BTS-1.5 Meg.	Horiz. Amp. Grid
R77	4.7 Meg.	½	23X20X475M	BTS-4.7 Meg.	Feedback
R78	5600Ω 10%	½	23X20X562K	BTS-5600	HV Osc. Grid
R79	120KΩ 10%	1	23X30X124K		HV Filter
R80	1200Ω 10%	1	23X30X122K	BW-1-1200	Filter
R81A	18Ω	2½			Surge Limiter-Wire Wound
B	18Ω	2½			Surge Limiter-Wire Wound
C	18Ω	4	24B879		Surge Limiter-Wire Wound
D	75Ω	4			Surge Limiter-Wire Wound
R82	680Ω	2	23X40X681M	BW-2-680	Filter
R83	330Ω	10	24BG332E		Filter-Wire Wound
R84	18Ω	10	24BG180E		Filament Dropping-Wire Wound
R85	39Ω 10%	1	23X30X390K	BW-1-39	HV Osc. Filament Shunt
R86	120Ω 10%	2	23X40X121M	BW-2-120	Ratio Det. Filament Shunt
R87	47Ω 10%	1	23X30X470K	BW-1-47	Osc. Filament Shunt
R88	4.7 Meg.	1	23X30X475M	BTA-4.7 Meg.	Horiz. Deflection Load
R89	5.6 Meg.	1	23X30X565M	BTA-5.6 Meg.	Vert. Deflection Load
R90	4.7 Meg.	1	23X30X475M	BTA-4.7 Meg.	Horiz. Deflection Load
R91	5.6 Meg.	1	23X30X565M	BTA-5.6 Meg.	Vert. Deflection Load
R92	3.3 Meg.	1	23X30X335M	BTA-3.3 Meg.	Voltage Divider
R93	3.3 Meg.	1	23X30X335M	BTA-3.3 Meg.	Voltage Divider
R94	3.3 Meg.	1	23X30X335M		Voltage Divider
R95	3.3 Meg.	1	23X30X335M		Voltage Divider
R96	4.7 Meg.	1	23X30X475M		Voltage Divider
R97	4.7 Meg.	1	23X30X475M		Voltage Divider
R98	3.9 Meg.	1	23X30X395M		Voltage Divider
R99	3.9 Meg.	1	23X30X395M		Voltage Divider

Note 1. Some models use 750KΩ resistor in this application.

TRANSFORMER

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: HALLICRAFTERS Part No.	REPLACEMENT DATA: STANCOR Part No.	REPLACEMENT DATA: MERIT Part No.	REPLACEMENT DATA: CHICAGO Part No.
T1	7Ω	450Ω	21Ω	0Ω	51B1150			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: Hallicrafters Part No.	REPLACEMENT DATA: STANCOR Part No.	REPLACEMENT DATA: MERIT Part No.	REPLACEMENT DATA: CHICAGO Part No.	INSTALLATION NOTES
T2	19000	3.6Ω	225Ω	7Ω	55B080-3	A-3876	A-3928	RO-2	

SPEAKER

ITEM No.	RATINGS: FIELD RES.	RATINGS: V. C. IMP.	REPLACEMENT DATA: HALLICRAFTER Part No.	REPLACEMENT DATA: VIKING Part No.	REPLACEMENT DATA: QUAM Part No.	NOTES
SP1	PM	3.6Ω	85B070	5729	57A1	
	CONE DIA.	V. C. DIA.				
SP2	4-3/4" x 7"	9/16"				

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	Hallicrafters PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.115A	58Ω	3.7 Henries	56C093	C-2304①	C-2991 ①	TR-4200①	① Drill new mounting holes.

CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	Hallicrafters PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L2		155Ω		56A102				
L3		155Ω		56A102				

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	HALLICRAFTER PART No.	MEISSNER PART No.	
L4	Ant. Input	.1Ω CT		51A1039		
L5	RF Coil	0Ω		51A1049		Wound on 1 Meg. resistor.
L6	RF Coil	0Ω		51A1050		Wound on 3.3KΩ, 1 watt resistor
L7	RF Coil	0Ω		51A1051		Wound on 2.2KΩ, 1 watt resistor
L8	RF Coil	0Ω		51A1048		Wound on 3.3KΩ, 1 watt resistor
L9	RF Choke	2.5Ω		53B008		Red color code
L10	Mixer Coil	0Ω		51A1041		Wound on 1 Meg. resistor
L11	Mixer Coil	0Ω		51A1046		Wound on 3.3KΩ, 1 watt resistor
L12	Mixer Coil	0Ω		51A1047		Wound on 2.2KΩ, 1 watt resistor
L13	Mixer Coil	0Ω		51A1048		Wound on 3.3KΩ, 1 watt resistor
L14	Osc. Coil	0Ω		50A1041		Wound on 1 Meg. resistor
L15	Osc. Coil	0Ω		50A1042		Wound on 1 Meg, 1 watt resistor
L16	Osc. Coil	0Ω		50A1043		Wound on 1 Meg., 1 watt resistor
L17	Osc. Coil	0Ω		50A1044		Wound on 1 Meg., 1 watt resistor
L18	Osc. Cath. Choke	2.5Ω		53B008		Red color code
L19A	Fil. Choke	.1Ω		53A133		Dual winding
B	Fil. Choke	.1Ω				
L20	1st Video IF	.1Ω		50A372-1		
L21	2nd Video IF	.1Ω		50A372-1		
L22	3rd Video IF	.1Ω		50A372-1		
L23	4th Video IF	.1Ω		50A372-1		
L24	Peaking	8Ω		51A1053		Wound on 33KΩ, 1 watt resistor
L25	Peaking	11Ω		51A1054		Wound on 1 Meg., 1 watt resistor
L26	Peaking	15Ω		51A1055		Wound on 68KΩ, 1 watt resistor
L27	Peaking	15Ω		51A1057		Wound on 1 Meg., 1 watt resistor
L28	Sound IF	5Ω		51B1037		
L29	Ratio Det. Trans.	5Ω	1Ω	50B406		
L30	Sync. Shaping	30Ω		51B1040		Wound on 470Ω, 1 watt resistor
L31A	HV Osc. Cath. Choke	40Ω		53A134		Dual Winding
B	HV Osc. Plate Choke	40Ω				

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	HALLICRAFTER PART No.	SYLVANIA PART No.		
M1	.180A	27B147	NE-5		

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
M2	RF Tuner	49X1203	Includes push-button switch, trimmers and coils
M3	Fuse	39A307	Type 3AG, 2A
M4	Antenna	57B126	Portable (Model 514)
	Cabinet Back	80844	Models 505, 506, 506M
	Knob	15B141	Height, width, Hor. centering, Vert. centering, Focus
	Knob	15B068-4	Model T-54 } Vert. Hold, Hor. Hold
	Knob	15B068-3	Models 505, 506M, 514 } Volume, Brightness,
	Knob	15B093-1	Model 506 } On-Off Contrast
	Knob	17A041	Models T-54, 506 } Push-Buttons and
	Knob	17A041-1	Models 505, 506M, 514 } Fine Tuning
	Trimmer Assembly	44B365	RF and Mixer (12 sections each)
	Trimmer Assembly	44B364	Oscillator (12 section)
	Trimmer	44A377	Hor. Linearity Adjustment
	Trimmer	48A199	Fine Tuning
	Trimmer	44A359	HV Osc.
	Socket	6B298	Picture Tube

FIGURE 1

GENERAL INFORMATION

The Markel Playmaster Models 74 and 75 are designed to play, automatically, one side or both sides, twelve 10" or 12", 33⅓ RPM records, twelve 10" or ten 12", 78 RPM records, without interruption, in sequence, and without turning them over. The Playmaster automatically stops and shuts off upon completion of the last 10" or 12" record.

It is also designed to play automatically twelve 7", 33⅓ RPM or ten 7", 45 RPM records one side only—and will continue playing the last 7" record until the "Off" button is pressed.

Manual operation is provided for playing home recordings or odd-sized records.

The Playmaster is equipped with two interchangeable pick-ups (playing heads) whose outputs are simply and easily adapted to conventional amplifiers. The black pick-up is used for playing all 78 RPM records, while the red pick-up is used for playing all microgroove (33⅓ and 45 RPM) records. The tone arm weight on 78 RPM records is approximately a half ounce (15 grams), and approximately ⅕ of an ounce (6 grams) on all microgroove (33⅓ and 45 RPM) records.

The motor operates on 115 to 117 volts, 60 cycles, A.C. only.

"B" models are available to operate on 115 to 117 volts, 50 cycles, A.C.

"H" models are available to operate on 234 volts, 60 cycles A.C.

"BH" models are available to operate on 234 volts, 50 cycles A.C.

The electrical control circuit operates on 6 to 10 volts, momentary contact only.

Approximately one ampere, required for operation of cycling mechanism and automatic shut-off, is supplied by an attached transformer.

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MARKEL
MODELS 74, 75

MARKEL
MODELS 74, 75

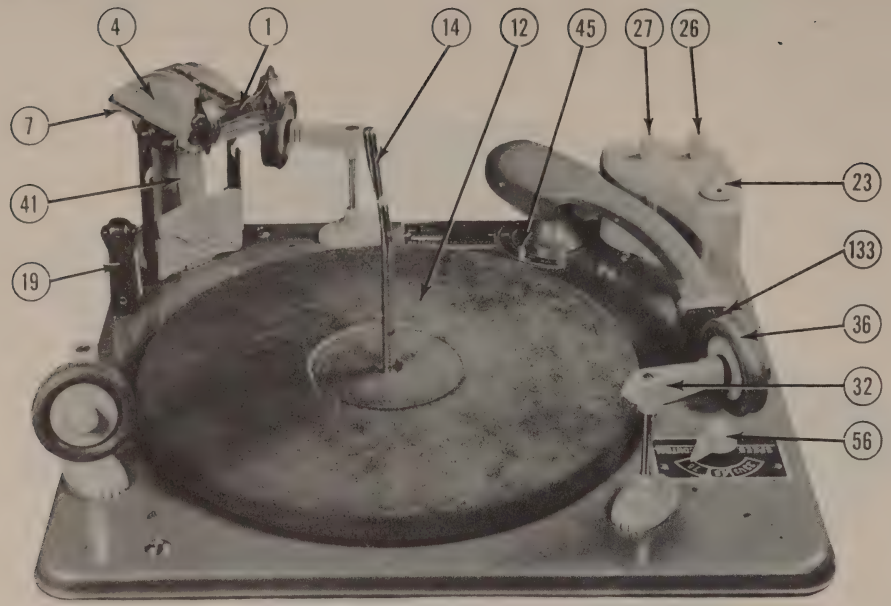


FIGURE 2

AUTOMATIC OPERATION

In placing the *Markel Playmaster* in operation, the following procedures are necessary to assure proper operation of the mechanism.

1. Insert the proper pick-up (19 or 133) in the tone arm (16), then place the tone arm on the needle rest (55). The red pick-up (19) is used for microgroove records (33⅓ or 45 RPM), the black pick-up (133) is used for 78 RPM records.
2. Turn the speed control knob (56) to 33⅓, 45, or 78 to correspond to the records to be played.
3. Pick the tone arm up and move it to the edge of the turntable. Hold it firmly in this position, then slide the set-down knob (45) to 7" or 10/12", depending on size of record to be played. Return the arm to the needle rest.

Loading Records

1. Before loading records, be sure that the tone arm is resting on the needle rest and that all three wheels that support the records are in the correct non-playing position as shown in Figure 3. If the three wheels are not in the correct non-playing position, turn each one to its correct position (you will hear a click when each wheel is positioned).
2. Rotate the record support in either direction until the support snaps into position to the size of records to be played—10" or 12"—and fold back the record stabilizer (1) away from the center post. When loading 7" records, raise the 7" push-off shelf (6A), then slide it back to lock into position. The center hole inserts must first be snapped into 45 RPM records.
3. Place a series of records on the center post so they will rest on the ledge of the center post and the record support.

CAUTION: Do not intermix sizes or types of records.

4. Fold back the record stabilizer, so that it rests on the top record. In playing 7" records, the record stabilizer should rest on 7" push-off shelf (6A).

CAUTION: If stabilizer (1) is not placed on the records or 7" push-off shelf (6A), the changer will shut off after playing the first record.

5. Set the sequence selector knob (23) to whatever sequence of operation is desired—one side or two sides.

NOTE: 7" record will play one side only.

6. Press the "On" button (26) completely down. The changer will now play the entire stack of records. Upon completion of a stack of 10" or 12" records, the changer will shut off, automatically; when 7" records are used, the changer will have to be turned off manually.
7. Any record, while playing, can be rejected by pressing the "Reject" button (26) all the way down and releasing slowly. The reject button will not operate when the sequence selector knob is set at "Manual."
8. The "Off" button (27) can be pressed during any portion of the change cycle or while the record is being played. The cycle can be resumed by pressing the "On" button. The tone arm may be moved manually, at any time, without damage to the mechanism.

CAUTION: For best performance, do not leave changer with records resting on wheels, or with wheels resting on turntable, or with tone arm resting on records or turntable.

9. Upon completion of the last record, the motor automatically shuts off (except when 7" records are played, in which case the last record will repeat itself until the "Off" button is pressed). The tone arm remains on the record; pick up the tone arm and gently place it on the needle rest.
10. Fold back the record stabilizer (1).
11. Lift the records straight up the center post.

NOTE: When all of the records have not been played, and the operator wishes to stop the changer and remove records when wheels (36) are resting on the records, it may be accomplished as follows:

1. Press the "Reject" button (26), and when the changer cycles, the wheels will automatically move off the record. When the tone arm sets down on the next record, press the "Off" button (27).
2. Pick up the tone arm and place it on the needle rest (55).
3. Fold back the record stabilizer (1).
4. Remove the records by lifting them straight up the center post.

MANUAL OPERATION

The following procedure is necessary to operate the changer manually, such as playing home recordings, odd-sized or single record selections:

1. Rotate the record support (7) to the 12" position. (If the wheels are on the turntable, press the "Reject" button, and when machine cycles, the wheels will automatically move off the turntable.)
2. Move the record stabilizer (1) away from the center post.
3. Turn the control knob (23) to "Manual" position.
4. Place the record to be played on the turntable.
5. Push down on the "On" button (26) and release.
6. Raise the tone arm from its rest position and place it on the starting grooves of the record.
7. The mechanism will shut off automatically at the end of the record if the record has a standard eccentric groove. If the mechanism does not stop, press the "Off" button (27).
8. Raise the tone arm from the record and place it on the needle rest.
9. Remove the record from the turntable.

CHANGER CYCLE

As the tone arm moves toward the center of the record, the tone arm collar assembly (65), which is fastened to the tone arm hinge and sleeve assembly (22), moves toward the trip switch (107). At the completion of the record, when the needle enters the eccentric groove, the trip screw (64) of the collar assembly (65) engages the trip switch (107), thus closing the trip switch and energizing the solenoid (105).

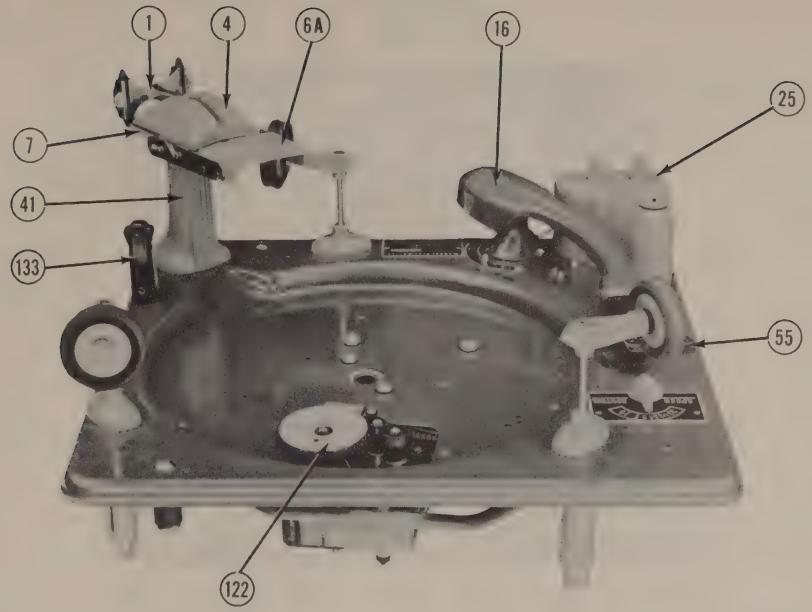


FIGURE 3

The tripping point for 33⅓ and 45 RPM records is earlier than for 78 RPM records. Therefore, when knob (56) is turned to 33⅓—45, the first two contacts on the trip switch cause the solenoid (105) to be energized. However, when knob (56) is turned to 78, all three contacts must be closed.

Energizing the solenoid pulls the starting pawl (A) of the main cam (127), Figure 5, causing the teeth of the pawl to mesh with turntable gear (120). This starts the cam (127) rotating, thus starting the change cycle.

As the cam (127) rotates, the hooked end of the tone arm follower (103) moves out of the recess (H), shown in Figure 6, closing the muting switch (119).

The tone arm raise lever (115) rides up the incline portion of track (G), shown in Figures 6 and 7, actuating the lift pin (20), which in turn raises the tone arm from the record.

The tone arm follower (103), riding around the cam face (F), pivots the retracting lever, which is staked to the tone arm follower (103), against the 7″/10″/12″ adjusting pin (66) of the tone arm collar assembly (65), swinging the tone arm out clear of the records and bringing the pin (66) into contact with the tone arm set-down lever (102).

Also, at this stage of the cam rotation, when the control knob is in the position marked "two sides," the selector lever (109) is pivoted clear of the path of the cam gate boss (C), and the cam gate (C) is switched from one side to the other by the pin of the main cam follower (98). Therefore, on the next rotation of the cam, the main cam follower pin is shunted into the inner cam track (E) for playing the underside of the record, or into the outer cam track (D) for playing the top side of the record. If the control knob (23) is in the position marked "one side," the boss on the cam gate (C) contacts the flange on the selector lever assembly (109), pivoting the gate outward so that the pin of the main cam follower always remains in the outer track (D) of the cam.

As the tone arm moves outward, the riser head assemblies (32) are rotated inward by the movement of the main cam follower through the following connected parts: the formed wheel turn lever (94), the straight wheel turn lever (95), and the offset wheel turn lever (123). The stud on the straight wheel turn lever (95) also actuates the push-off cam assembly (81), which in turn actuates the push-off lever (13) and the push-off slide plate (6), thereby dropping a record to the wheels. As the cam follower pin (98) moves by the cam gate (C), Figure 5, it is switched into the inner cam track (E) and the design of the cam track causes the cam follower to continue to pivot the riser heads inward and to lower the wheels to the turntable. During the next change cycle, or during one side operation, the cam gate switches the cam follower pin into the outer cam track (D) and the design of the cam track causes the cam follower to return the riser heads and the push-off slide plate to their original positions, thus dropping the record to the turntable.

The shape of the cam face (F), Figure 6, and the spring (101) which pulls on the retracting lever of assembly (103) now moves the retracting lever away from the 7″/10″/12″ pin (66) on the tone arm collar (65). This causes the tone arm set-down lever assembly (102) to move out (due to the friction set up by the parts [100 to 103]) until the set-down lever (102) contacts the 10″/12″ change lever (99). This positions the tone arm for set-down. The tone arm is held in stationary position by the tone arm set-down lever assembly (102) until the tone arm comes to a rest on the record, at which time the pin on tone arm follower assembly (103) moves against set-down lever assembly (102), thus giving free movement to the tone arm.

The tone arm tension arm (106) pivots on the same stud as does the selector lever assembly (109). The extension arm stud (part of tension arm assembly 106) slides in the groove of the main cam follower (98) and is actuated by this follower. The finger on the tension arm assembly slides in the slot in the link of the raise lever assembly (115). As a result, when the main cam follower rides in the cam groove (D), the finger of the tension arm moves against the end of the slot of the link (assembly 115), Figure 7. This relieves the spring tension on the link, allowing the raise lever (115) to ride down the incline surface of the cam track (G), Figure 6, lowering the tone arm to the record. However, when the control knob is in the position marked "two sides," with the main cam follower riding in the cam groove (E), the tension arm (106) is moved forward, allowing the spring (108) to pull on the link, which in turn pivots the raise lever (115) upward. This action raises the tone arm to the record.

The hooked end of the tone arm follower (103) now rides into the recess (H) of the cam, Figure 6, moving away from the muting switch; at the same time, this causes the pin in the retracting lever (part of assembly 103) to move against the tone arm set-down lever of assembly (102), thus giving free movement to the tone arm. In this position, the tone arm follower (103) also holds the main cam in a neutral position. This completes the change cycle.

AUTOMATIC SHUT-OFF

When the last 10″ or 12″ record is ejected from the record shelf, the record stabilizer (1) drops down against the automatic stop hinge (5), which in turn pushes down on the push-off lever (13). As the push-off cam (81) returns the slide plate (6) to its original position, the push-off lever (13) is pulled against the shut-off spring (83), closing the contacts of the bale switch (96). When the record is finished playing, the adjusting screw (64) of the collar assembly (65) contacts the trip switch (107). This closes the circuit energizing the latching solenoid (129), tripping the main switch (53), shutting off the unit.

MANUAL POSITION

Normally, the manual switch (110) is held in a closed position; however, when the control is turned to "Manual," the switch (110) is opened, thereby opening the circuit to the trip solenoid (105).

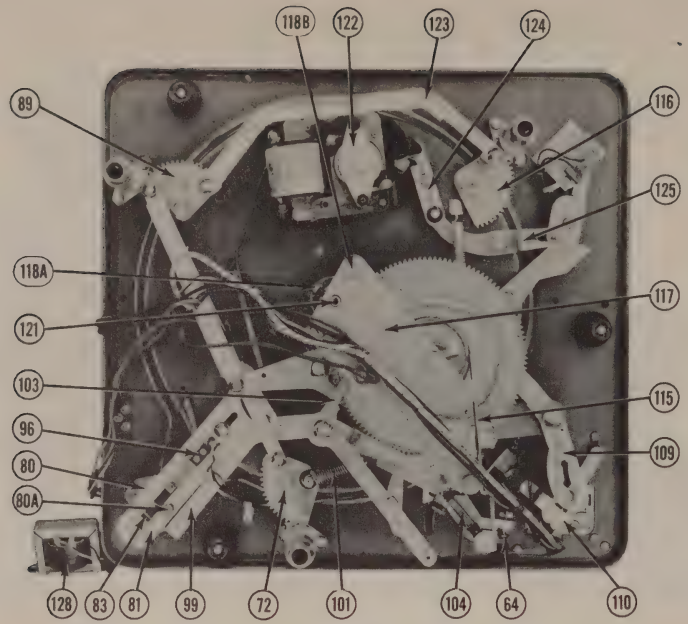


FIGURE 4

GENERAL SERVICE INFORMATION

Electrical Circuit

A careful study of the schematic diagram incorporated with this manual will show that basically there are two electrical circuits employed.

First a 110-volt circuit opened and closed by two contacts on main switch (53) and connected to operate the motor (122) and step-down transformer (128).

Second, a low voltage control circuit consisting of two solenoids (105, 129), two leaf switches (107, 96), two slide switches (53, 52), one toggle switch (110) and a sliding snap switch (126). The latching solenoid (129) when energized pulls the latch away from the plunger of main switch (53), thus releasing the switch which springs up and cuts off the motor and step-down transformer. The trip solenoid (105) when energized moves the cam cycling pawl (A), Figure 5, into contact with the turntable gear (120), starting the cam motion and changer cycle. The leaf trip switch (107) is adjusted to determine *when* action takes place, cycling, *and* shut-off. The leaf bale switch (96) determines *which* action takes place, cycling *or* shut-off.

The changer will start to cycle when the trip switch (107) is closed, if the bale switch (96) center leaf is making contact with the third leaf. The changer will shut off when the trip switch (107) is closed if the bale switch (96) center leaf is making contact with the first leaf.

The slide switch (53) opens and closes both 110-volt circuits and low voltage energizing circuit in the first two of its positions. In the third position, this switch also closes a low voltage reject circuit which energizes the trip solenoid (105) and starts the machine to cycle.

The slide switch (53) closes the low voltage shut-off circuit, energizing the latching solenoid (129), shutting off the machine.

The toggle switch (110) is normally closed, completing the circuit to the trip solenoid (105). When this switch is open for manual playing, the trip solenoid circuit is open and the changer will not cycle.

The sliding snap switch (126) is activated by the speed control knob. At 33⅓ or 45 RPM this switch is closed, energizing the first and second leaves of trip switch (107). At 78 RPM this switch is open, energizing the first and third leaves of trip switch (107).

Adjustment of Electrical Circuit

(a) Trip Switch (107)

Adjust the trip screw (64) so that the first and second leaves of the trip switch (107) are closed when the tone arm reaches the inside eccentric groove of 33⅓ and 45 RPM records—*then lock* the nut on the trip screw (64). To adjust for tripping of 78 RPM records, bend the third leaf slightly so that contact is not closed until the tone arm reaches the inside eccentric groove of the 78 RPM records. The eccentric groove on 78 RPM records is further to the inside than on microgroove records.

(b) Bale Switch (96)

The bale switch (96) determines what happens—shut-off or cycle. When there are one or more records on the push-off shelf (7) or the 7" push-off shelf (6A) is in a horizontal position, the center and third leaf should be making contact. This permits the unit to cycle automatically. When the last 10" or 12" record is pushed off the shelf, the push-off lever (13) presses down on the shut-off spring (83), which causes the center leaf to break with the third leaf and make contact with the first leaf. If the first and third leaves are not so spaced, they must be bent slightly so as to operate in this manner. The bale switch causes the unit to cycle if leaves two and three are made—shut off if leaves two and one are made (see schematic diagram).

Removing the Center Post

To remove the center post, loosen screw (118A), then loosen the center post spring mounting screw (118B) and pivot the spring (121) out of the hole in the center post (see Figure 4). The center post may now be removed by lifting it straight up.

In replacing the center post, be sure that the ledge of the center post is facing away from the push-off shelf (7). Insert the spring (121) in the center post and tighten the screw (118B). Then tighten screw (118A), Figure 4, then lock with nut.

Removing the Turntable

In removing the turntable, it is necessary to first remove the center post and then loosen the two set screws holding the turntable gear (120) to the turntable sleeve. After this is done, the turntable may be removed by lifting it straight up.

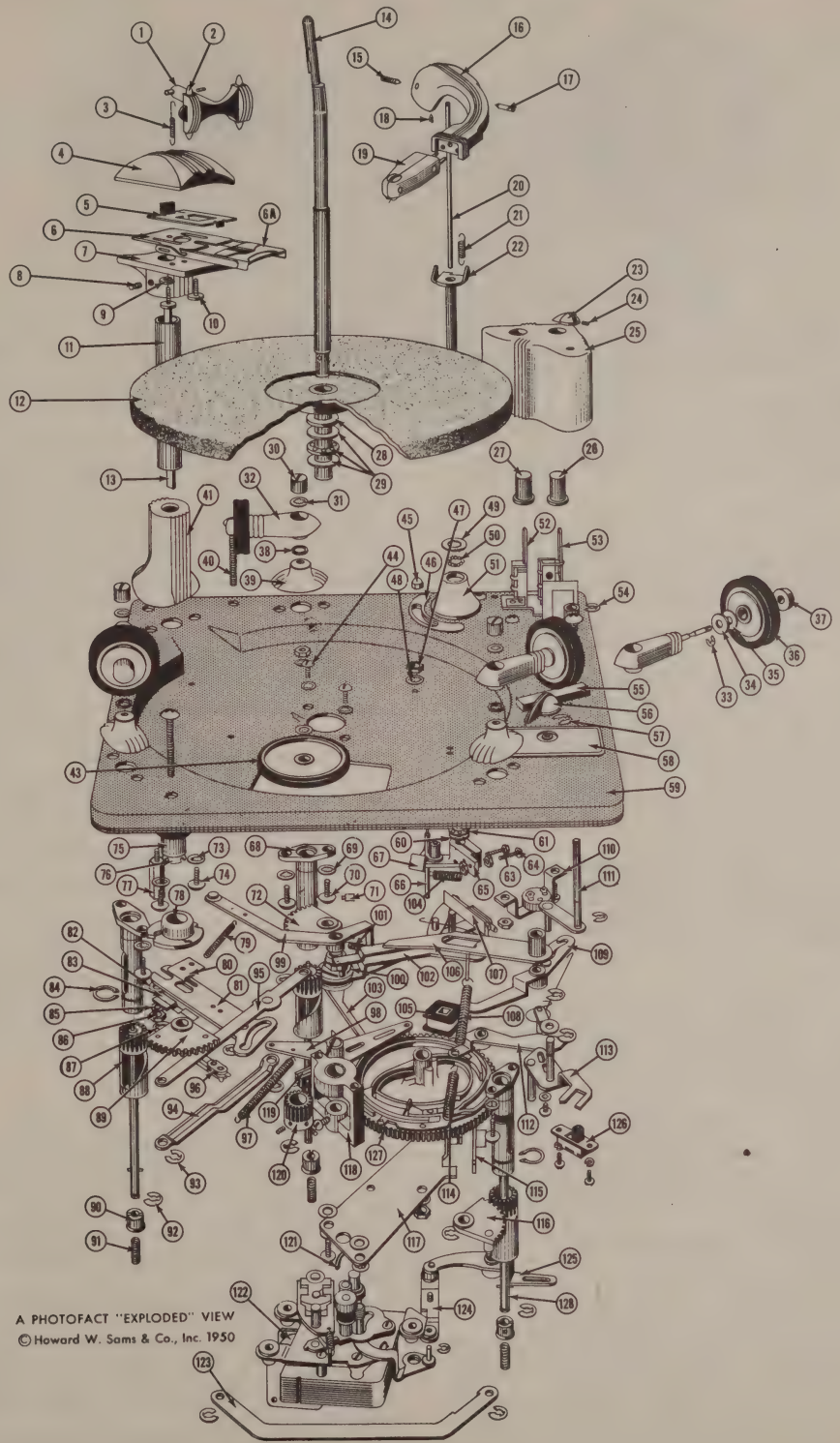
In replacing the turntable, be sure to replace the felt washer (28) and the thrust bearing assembly (29) in their proper positions, as shown in the exploded view. Push the idler wheel (43) back out of the way so that the turntable will be seated and the idler wheel will contact the rim of the turntable. Also, before the turntable is seated, the turntable sleeve must be inserted in the turntable gear (120).

After these steps have been taken, push the turntable gear up, leaving a space of approximately .015" between the gear and the bearing in the center bearing support (118). Tighten the set screws.

Record Support Alignment

Proper alignment of the record support is necessary for proper record ejection:

1. Be sure the mechanism is out of cycle.
2. Rotate the record shelf to the 10" position.
3. Place a 10" record on the step of the center post (14), allowing it to rest on the support shelf (7).
4. Loosen the set screw (8) and align the curvature of the support shelf (7) to the edge of the record.
5. Tighten the set screw.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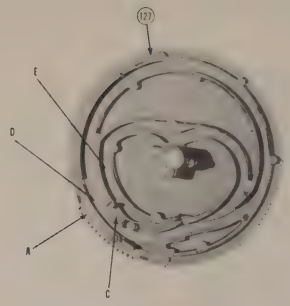


FIGURE 5

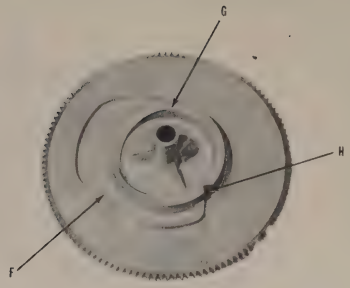


FIGURE 6

Two Records Drop at Once

1. Hole in record too large: Check the diameter of the hole in the record. An oversize hole will cause two records to drop at once.
2. Center post slide not fully down:
   (a) Check the slide to be sure it is free and does not bind at any point. Clean out all foreign material or straighten, if necessary. Do *not* oil.
   (b) When records are placed on the center post, be sure the slide is all the way down.

Record Does Not Drop When Changer Cycles

1. Push-off slide plate (6) out of adjustment. The slide plate (6) should move far enough forward to push the record off the edge of the record support shelf (7).
   (a) Loosen the set screw (80A), Figure 4, and slide the push-off cam adjuster (80) away from the center post. Tighten the screw and check the adjustment.

CAUTION: If push-off cam adjuster (80) is set too far away from center post, the slide plate (6) will over-travel and changer will bind.

2. Hole in record too small: Check the diameter of the hole in the record. An undersize hole will cause the record to hang up on the center post.
3. Screw (80A) loose, thereby allowing the push-off cam adjuster (80) to slide on the push-off cam instead of actuating the push-off lever (13). Adjust and tighten screw (80A) as in Number 1 above.

Tone Arm Does Not Move Horizontally When the Mechanism Is Cycling

1. Tone arm lift pin (20) is missing.
2. Cam follower spring (101) loose: If this spring is loose the tone arm follower (103) will not be held against the cam face (F), thereby not actuating the collar assembly (65).
3. Collar assembly (65) loose on the tone arm mounting bracket. If this condition exists, the tone arm may not move with the collar.

Irregular Landing of the Tone Arm

1. Toggle spring on set-down lever assembly (102) loose and/or has lost tension. If the toggle spring is loose, the set-down lever of assembly (102) will not be snapped around the 7" or 10" pin of the collar assembly (65), and the arm may move slightly, either direction, when it is lowered to the turntable.
2. Collar assembly (65) loose on the tone arm hinge and assembly sleeve (22).
3. Set screws in change cam (78) loose.
4. Spring (104) loose. If spring (104) is loose, it will allow the tone arm to move around since this spring holds the pin in position. The pin determines the 7" and 10"/12" set-down.
5. The tone arm follower and retracting lever assembly is pre-set at the factory so that the clutch slips at approximately 3½ to 5½ ounces. Adjust nut (100) to increase or decrease this clutch to these limits.
6. Excess play between tone arm and hinge or any play in tone arm hinge and sleeve assembly (22).

Tone Arm Does Not Set Down Properly on 7"—10"—12" Records

1. 10"—12" records.
   (a) Place a 10" record on the turntable.
   (b) Trip the mechanism, stop the mechanism just as soon as the tone arm starts to drop to the record and while the pin on the 7" and 10"/12" index adjusting lever (66) is held firmly by the tone arm, set down lever assembly (102).
   (c) Loosen hex cap screw (63) and re-set tone arm to correct position maintaining approximately .005" vertical movement in the tone arm post assembly. Tighten hex cap screw.
   (d) After tone arm set-down is readjusted, it may be necessary to readjust trip screw (64) to assure correct trip position.
2. 7" records.
   (a) Place a 10" record on the turntable and also a 7" record.
   (b) Be certain that the 10" set-down is correct. If not, correct according to instructions in above.
   (c) Set unit for playing 7" records by moving hex cap nut (45) into 7" set-down position.
   (d) Set selector control knob (23) into one-side position and press "On" button (26).
   (e) Allow needle to set down on record and stop immediately. Note the amount and direction of the deviation of set-down.
   (f) Adjustment of the 7" set-down is made by bending the ear (67) of the 7" index adjusting lever. There are two ears on this lever—bend only the one closest to the edge of the changer base plate. Be careful not to loosen staking of this lever when bending the ear.
   (g) If the set-down on the record is too far toward the inside, bend the ear (67) inward to restrict the amount of travel of the 7" index lever.
   (h) If the set-down is on the outside of the record, bend the ear (67) outward to increase the amount of travel of the 7" index lever. A very minimum of bend in either direction changes the degree of set-down considerably.

Tone Arm Does Not Raise to Play Under Side of a Record

1. Black pick-up will prevent raise of tone arm if speed selector knob is set at 33⅓ or 45 RPM.
2. Tone arm lift pin (20) is missing.
3. Raise lever springs (108) and/or (114) disconnected or missing. These springs apply tension to the link of the raise lever assembly (115), raising the tone arm to the record. (See adjustment of tone arm pressures.)
4. The counter balance spring in rear of tone arm has become detached.
5. Tone arm raise lever assembly (115) is not riding on track (G), shown Figures 6 and 7.

Changer Trips Before Needle Reaches End of Record or Fails to Trip

1. Trip screw (64) out of adjustment: The trip screw (64) should be adjusted so that it will close the contacts of the trip switch (107) upon completion of a record. This trip point may be adjusted by turning the screw (64) in to advance tripping, and out to delay the tripping action. (See adjustment of electrical circuit.)
2. Study schematic diagram incorporated in this manual and "Electrical Circuit" section.

Adjustment of Tone Arm Pressures

Readjustment of pressures of the tone arm should be made strictly according to following sequence:

1. The tone arm (16) should be perfectly balanced and move freely on pivot pins (15-17) when there is no cartridge inserted in the arm and the counterbalance spring (21) is disconnected. There should be no excess play.
2. (a) Connect up the counterbalance spring (21), insert the red pick-up (19). The downward pressure at the tip of the cartridge should be approximately 6 grams. If incorrect, this pressure can be varied either way by slightly bending the tail of the tone arm hinge (22).
   (b) The upward pressure can be checked by putting the changer in an upward cycle. Set speed control knob at 33⅓ or 45 RPM. A six-gram weight placed on tip of pick-up should balance the arm. If this condition does not exist, the pressure can be varied by bending the adjustment lug (131) either way.
3. (a) Inserting the black pick-up (133) changes the downward pressure to approximately 15 grams. The weight of the black pick-up itself compensates for this required increase. No adjustment is necessary.
   (b) The upward pressure for 78 RPM can be checked by putting changer in an upward cycle and changing speed control to 78 RPM. With black pick-up (133) inserted, a 15 gram

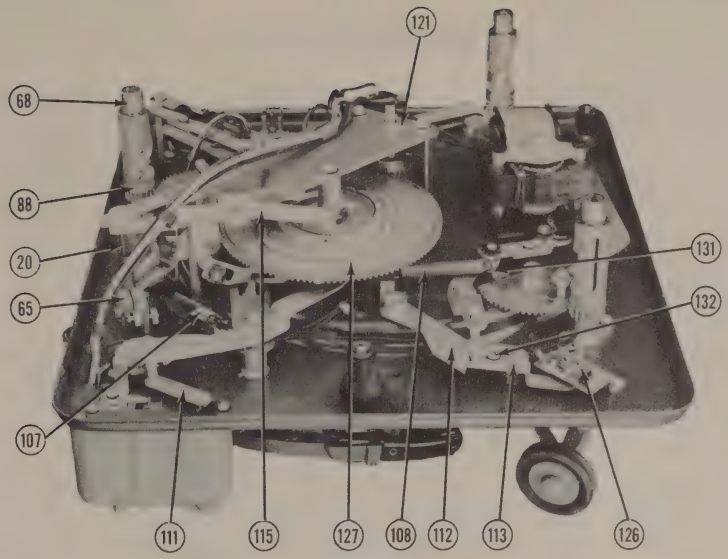


FIGURE 7

weight placed on the tip of pick-up should balance the arm. If this condition does not exist, the pressure can be varied by changing slightly the adjustment screw (132).

Changer Does Not Cycle

1. Selector switch (110) is set at manual.
2. Faulty wiring may prevent power being supplied to the solenoid (105). See above section on electrical circuit.
3. Turntable gear (120) loose on turntable sleeve.
4. Cam cycling pawl (A), Figure 5, binds, therefore not actuated by the solenoid (105).

Changer Does Not Shut Off After Last Record Has Been Played

1. Record stabilizer resting on 7" push-off shelf (6A).
2. Faulty wiring: Check the wiring diagram; also see above section on electrical circuit and adjustments.
3. Spring (83) loose or moved to one side. If this condition exists, the spring (83) will not close the switch contacts when the push-off lever (13) is pushed down and forward. (See adjustment electrical circuit.)
4. "Reject-On" button binds in plastic switch cover.

Wheels Chatter on Record

1. Turn wheels to proper position. You will hear a click when the proper position is reached.

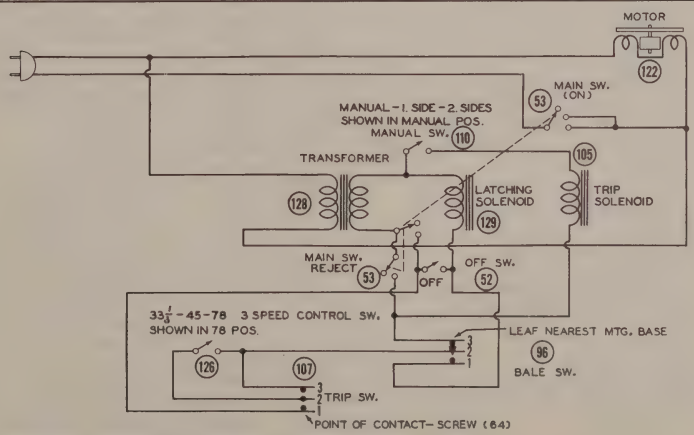
2. The wheels should be adjusted so that the wheel shaft in the riser head (32) is directly pointing to the center post. This is done by loosening the cap nut (30) and rotating the riser head. It is necessary to hold the riser shaft (128) firmly while tightening cap nut (30).

LUBRICATION

Lubrication applied at the time of manufacture is usually sufficient for a long period of time; however, should it become necessary to lubricate, due to excessive use or high-operating temperature, the mechanism should be lubricated as follows:

Use a good, light grease on the teeth, the cam tracks and cam surfaces, and gate of the main cam (127). Turntable thrust bearing assembly (29), ball bearings in the post assembly (50 and 61), and all other pivot and frictional points may be lubricated slightly.

CAUTION: Avoid excessive lubrication. Excessive or heavy grease on the starting pawl (A) of the cam (127) will tend to overcome action of the solenoid (105) and machine will not cycle. Do not, under any circumstances, permit oil or grease to come in contact with the idler wheel (43), the turntable rim, or the rubber wheel (36). Any oil or grease at these points should be removed with naphtha.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	B-7010	Record stabilizer
2	A-7012	Rubber bumper for bale
3	W-7008	Record stabilizer spring
4	GP-7009	Push-off cap
5	S-7026	Automatic stop hinge
6	S-7046	Three-speed push-off plate
6A	GP-7015	7″ Push-off shelf
7	GP-7008	Push-off shelf
8	M-449	10-32 x ¼ headless set screw
9	Z-7017	"Kantlink" washer No. 6
10	M-269	6-32 x ⅜ R. H. machine screw
11	U-7002	Push-off post shaft
12	A-7018-K	10″ turntable assembly
13	S-7015	Push-off lever
14	R-7001	Centerpost
15	M-7023	8-32 x ⅝—60° cone point headless pivot screw
16	B-7016	Tone arm
17	E-7042	Tone arm pivot pin
18	M-7022	8-32 x ⅛ round point set screw
19	A-7094	Cartridge—1 mil—with styluses
	A-7060	Stylus—1 mil osmium-tipped, for A-7094
	A-7062	Stylus sapphire—1 mil tip, for A-7094
133	A-7095	Cartridge—3 mil—with styluses
	A-7059	Stylus—3 mil osmium-tipped, for A-7095
	A-7061	Stylus—sapphire—3 mil tip, for A-7095
20	R-7009	Tone arm lift pin
21	W-7017	Tone arm counterweight spring
22	S-7026-A	Tone arm hinge and sleeve
23	GP-7014	Turn knob for switch
24	M-1715	5-40 x 3/16 socket headless set screw cone point
25	GP-7010	Main switch cover
26	GP-7013	Push button
27	GP-7013	Push button
28	Z-7001	Felt washer
29	A-7003	Thrust bearing assembly
30	E-7035	Slotted cap nut—riser shaft
31	Z-139	8-32 x 1/32 shakeproof lockwasher
32	GP-7004-A	Riser head and wheel assembly
33	Z-7006	"C" washer
34	Z-7008	Felt washer
35	Z-7020	Paper washer
36	A-7011-A	Wheel assembly
37	GP-7011	Wheel shaft cap
38	Z-7016	Flat washer
39	GP-7006	Riser bushing
40	M-7013	10-32 x 1½ Ph. Hd. machine screw
41	GP-7007	Push-off post
42		Lockwasher
43		Idler wheel
44		Center bearing support mounting screw
45	F-69-1	Hex cap nut
46	A-7088	7″—10″ indicator plate
47		Hex nut
48		Flat washer
49	Z-7030	5/16 I.D. x ¾ O.D. x .015 washer
50	A-7032	⅛″ ball bearing
51	B-7009	Tone arm post housing
52	A-7022	Shut-off switch
53	A-7021	Main switch
54	Z-7004	"C" washer
55	A-7056	Tone arm rest pad
56	GP-7014	Speed change selector knob
57		"C" washer
58	A-7093	Indicator plate (78-45-33⅓)
59	S-7001-4	Base plate
60	Z-7030	Washer 5/16 I.D. x ¾ O.D. x .015
61	A-7067	Ball and retainer needle bearing
62	F-217	Hex nut
63	M-7010	Hex cap screw
64	M-251	8-32 x ⅝ R.H.M.S. trip screw
65	B-7006-2	Tone arm adjusting collar
66 & 67	S-7065	7″ and 10″ index adjusting lever
68	B-7011	Inside barrel
69	Z-139	8/32 x 1/32 shakeproof lockwasher
70	M-254	8/32 x 7/16 R.H.M.S.
71	M-7003	Screw riser barrel bushing
72	B-7007-2	Quadrant gear
73	Z-138	6-32 x 1/32 lockwasher
74	M-158	10-24 x 5/16 R.H.M.S.
75	A-7016	Rubber mounts
76	A-7024-1	Cone
77	E-7015	Push-off cam post
78	B-7008-1	10″—12″ change cam
79	W-7003	10″—12″ change lever spring
80	S-7030	Push-off cam adjuster
81	S-7013-A	Push-off cam assembly (including push-off switch) (item 96)
82		Flatwasher
83	W-7015	Shut-off spring
84	Z-7007	"C" washer—riser barrel
85	Z-7015	Spacer
86	F-218	Hex nut
87	Z-7005	"C" washer
88	B-7012	Outside barrel
89	B-7007-1	Quadrant gear
90	V-7005	Bushing—riser barrel
91	W-7016	Riser head bearing spring
92	Z-7010	"C" washer—riser shaft
93		"C" washer
94	S-7010	Formed wheel turn lever
95	S-7012	Straight wheel turn lever
96	A-7006	Bale switch
97	W-7009-1	Main cam follower spring
98	S-7009-1	Main cam follower
99	S-7016	10″—12″ changer lever
100	F-7004	Hex Nut
	Z-7034	Spring washer
	Z-7037	Lockwasher, external shakeproof
	Z-7032	Fiber washer
	Z-7038	Asbestos fiber washer
101	W-7021	Tone arm cam follower spring
102	S-7058	Tone arm set down lever assembly
103	S-7019	Tone arm follower and retracting lever assembly
104	W-7006	7″ trip stud spring
105	A-7092	Trip solenoid
106	S-7008	Tone arm tension arm
107	A-7055	Trip switch
108	W-7019	Tone arm spring 33⅓—45
109	S-7022	Selector lever assembly (including spring W7013)
110	A-7023	Manual switch
111	E-7032	Selector control shaft
112	S-7049-1	Spring tension arm
113	S-7066	3-speed change arm and switch actuating lever
114	W-7018	Tone arm spring 78
115	S-7005-1	Tone arm raise lever assembly
116	B-7007-3	Quadrant gear
117	S-7004	Cam plate sub-assembly
118	B-7002-1	Center bearing support
119	A-7026	Muting switch
120	B-7013	Turntable gear
121	W-7012	Centerpost spring
122	A-7091	3-speed motor (GI) (includes idler wheel)
123	S-7011-2	Offset wheel turn lever
124	S-7052	3-speed adjustment lever
125	S-7067	3-speed change lever assembly
126	A-7089-3	3-speed control switch
127	B-7003	Main cam assembly
128	A-7033	Transformer
129	A-7015	Latching solenoid
130	A-7023	Manual switch
131	S-7047	Adjustment lug for 33⅓—45 R.P.M. upward tone arm tension
132	M-170	Adjustment screw for 78 R.P.M. upward tone arm tension
133	A-7095	Cartridge—3 mil—with stylus

FIG. 1—TOP VIEW

GENERAL INFORMATION

The Series 700R record changer is of the single-post type, featuring single-button control and eccentric spindle cam record selection. It is designed to play automatically up to ten 12-inch records or twelve 10-inch records, not intermixed. The last record will be repeated until the changer is turned off. The pickup arm support is designed so as to prevent damage to the mechanism if the pickup arm is handled during any part of the change cycle.

Parts should be ordered from the manufacturer of the receiver using this changer.

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RECORD CHANGER
SERIES 700R

RECORD CHANGER
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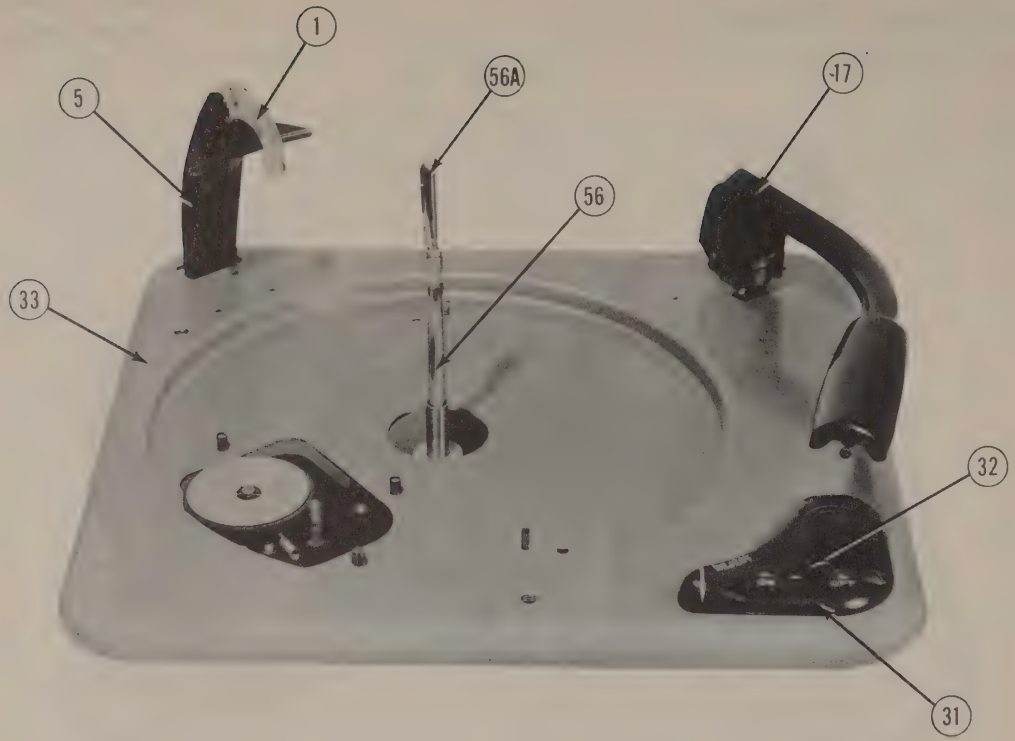

FIG. 2—TOP VIEW LESS TURNTABLE

AUTOMATIC OPERATION

1. Raise the record stabilizer (1) to its vertical position.
2. Move the record support (5) forward for 10-inch records, and away from the spindle for 12-inch records.
3. Place the records to be played on the spindle so they will rest on the record support (5) and the eccentric (63) or step of the spindle.
4. Lower the record stabilizer to the record.
5. Move the "On-Off" switch (32) to the "On" position.
6. Push the switch plate (31) in the direction indicated by the arrow. This sets the changing mechanism into operation, dropping the first record to the turntable. The changer will now play the entire stack of records and will continue playing the last record until the changer is shut off.
7. A record may be rejected at any time while playing by moving the switch plate.
8. To stop the changer, move the "On-Off" switch (32) to the "Off" position; raise the pickup arm and move it out to its rest position.
9. Raise the record stabilizer.
10. Remove the records from the turntable.

MANUAL OPERATION

1. Raise the stabilizer (1) to its vertical position.
2. Push the record support (5) into the 12-inch position.
3. Place the record to be played on the turntable.
4. Move the "On-Off" switch to the "On" position.
5. Lift the pickup arm to disengage it from its rest, and place the pickup arm on the record.
6. After the record is completed, turn the "On-Off" switch (32) to the "Off" position, and place the pickup arm on its rest.

CHANGE CYCLE

When the switch button (32) is turned to the "On" position, power is supplied to the motor (52), causing the turntable (6) to rotate. The automatic mechanism is then put into operation by moving the switch plate (31) in the direction indicated by the arrow. By this action, the reject trip lever (43), which is connected to the switch plate, is pulled against the cam trip actuator (59). This moves the cam trip actuator enough to allow the spring-loaded pinion actuating lever (62) to raise, which, in turn, lifts the brass pinion (15). As a result, the finger of the adjustable driving collar (10), which is fastened to the turntable hub, engages a projection on the brass pinion. This sets the pinion (15) and the cam (58) in rotation. A single revolution of the main cam performs all of the required change cycle function.

As the main cam rotates, the pin of the sweep lever (42) rides up the incline and into the groove of the cam. This action raises the pickup arm and swings it out to clear the record. At this point of cam rotation, the 10-inch and 12-inch indexing is determined. This is accomplished by means of the frog (58A) of the main cam, which is moved from one side to another by the 10-inch actuating lever (49). When the record support is in the 10-inch position, the actuating lever (49) is lowered; therefore, as the cam rotates, the pin of the frog comes in contact with the lever and is moved away from the spindle, setting the indexing track for 10-inch positioning.

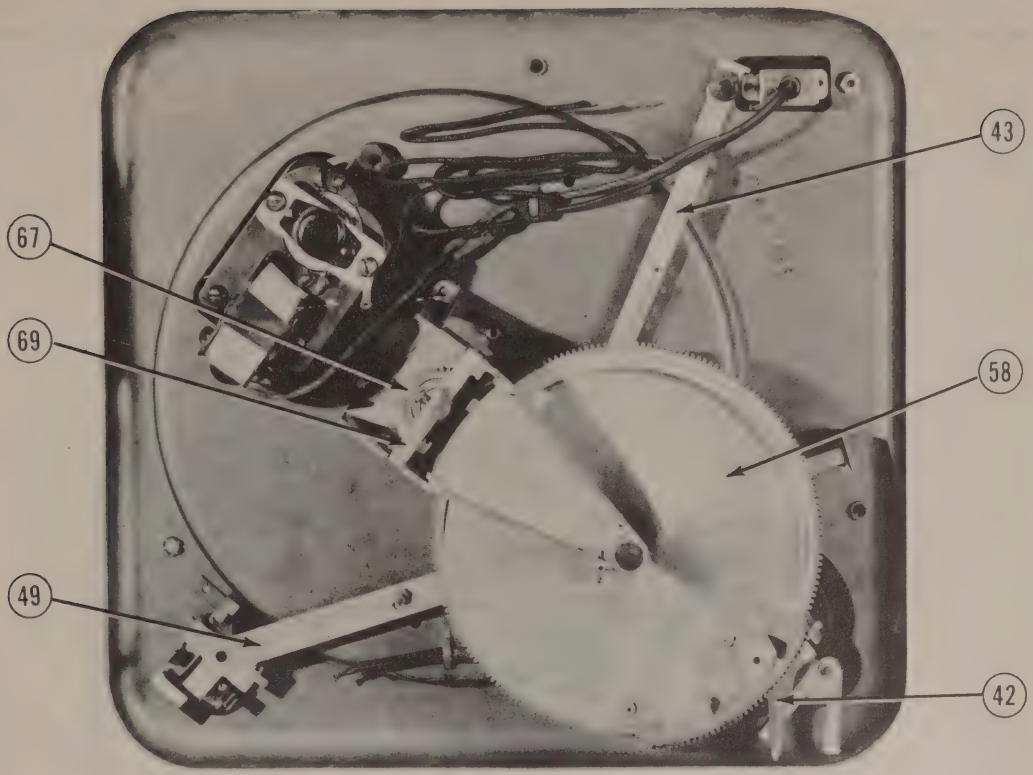

FIG. 3—BOTTOM VIEW

The spring-loaded actuating lever (62), which actuates the pinion (15), is automatically reset with the trip actuator (59) by the cam (64A) of the positioning bracket (64).

The extended section of teeth of the main cam now engages and rotates the pinion (67), which, in turn, rotates the eccentric assembly (63), thus selecting and dropping a record to the turntable. After the record has been dropped, the wide portion on the cam moves away from the pinion. The eccentric is now aligned with the lower part of the spindle and is held in this position by a leaf spring (71), which detents into a slot in the underside of the spindle cam pinion (67).

The sweep lever pin (42) now moves into the inner indexing track, moving the pickup arm in and positioning it for 10-inch set down. The end of the frog is designed so that it will be pivoted toward the spindle when it comes in contact with the sweep lever pin (42). This sets the indexing track for 12-inch positioning. This operation is repeated in each change cyclé; i.e., when the record support is in the 10-inch position. However, when the record support is in the 12-inch position the actuating lever (49) is raised above the frog. This allows the frog to stay in the inward position at all times.

The sweep lever pin (42) now rides down the incline of the main cam (58), lowering the pickup arm to the record. The washer mounted on the floating brass pinion (15) drops into a depression on the top edge of the rim of the cam, disengaging it from the driving collar (10). The main cam is now held in this position by the ground spring (46). This completes the change cycle.

Velocity Trip

The velocity trip assembly (40) is composed of three parts: The "V" lever (A), the trip lever (B), and the crescent lever (C). The "V" lever and the trip lever work as a friction clutch. As the pickup arm moves toward the center of the record, the sickle-shaped portion of the sweep lever (42) comes into contact with one leg of the "V" lever, causing the trip lever to move toward the spindle. This inward movement of the trip assembly continues until the tip of the trip lever (B) is in range of the finger on the adjustable collar (15). Once this position is attained, and as long as the movement of the needle toward the spindle is less than ⅛" per revolution, the tip of the trip lever will be pushed away from the spindle. This means that the friction clutch slips a corresponding amount; however, when the needle moves into the fast lead-in groove, the trip lever moves in rapidly allowing the crescent lever (C) to slide off the flat surface of the cam trip actuator (59). As a result, the next revolution of the collar (10) will force the trip lever outward causing the crescent lever to pull against the trip actuator (59) enough to unlatch the actuating pinion lever (62), thus starting a change cycle.

ADJUSTMENTS

Pickup Arm Set-Down Point

In early production the set-down point was adjusted by means of two adjusting screws in the bottom cam (27). These screws contact a flat on the pickup arm support rod (27A) in such a manner as to cause the bottom cam to turn when the set screws are turned in and out. To move the set-down position, loosen one screw and tighten the other until the correct position is obtained. Make certain that both screws are tightened after the adjustment has been completed.

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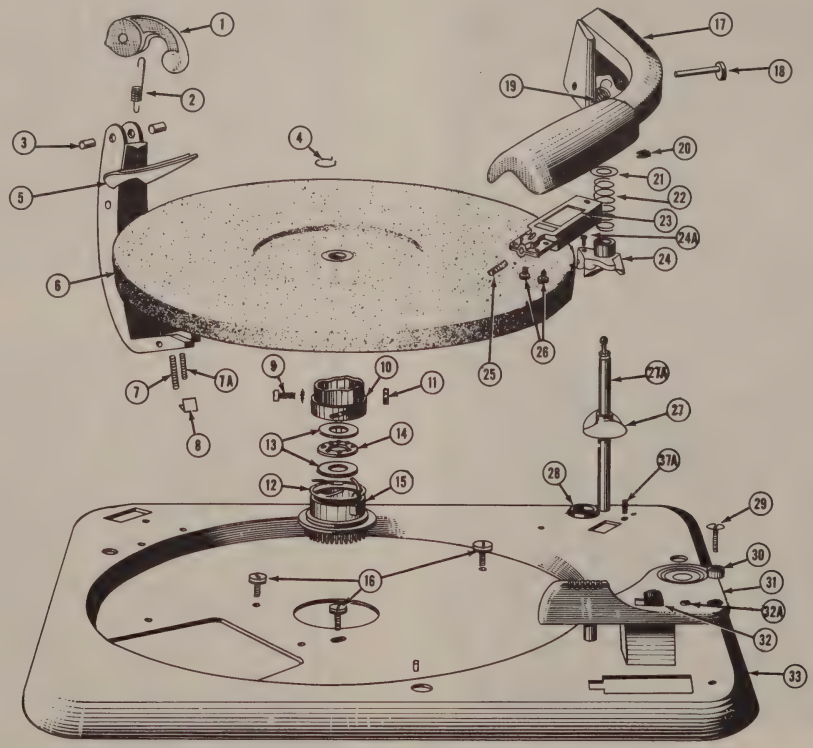

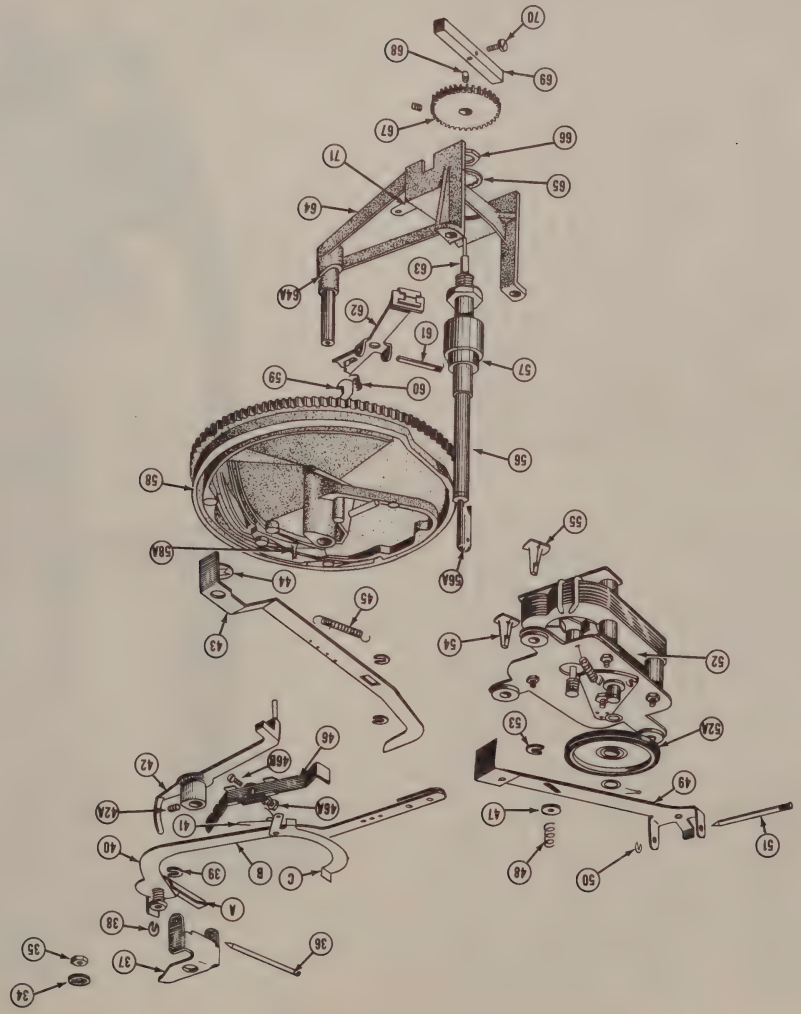
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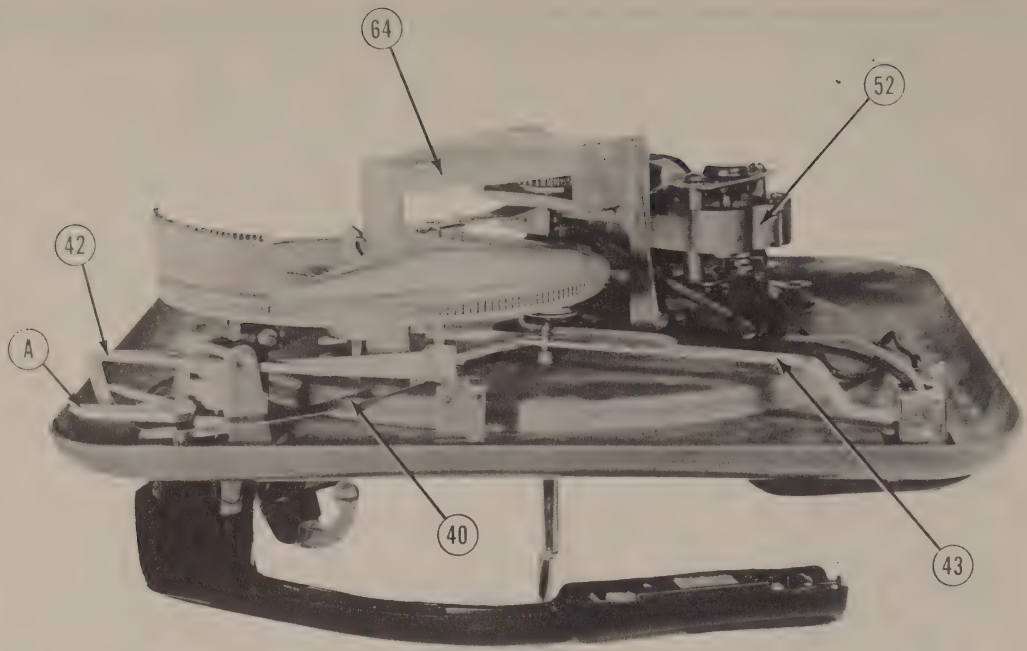


FIG. 4—SIDE VIEW

In late production the changer has an eccentric pin (18) in pickup arm and the bottom cam (27) is press fitted to the support rod (27A). To check the adjustment, place a 10-inch record on the turntable, move the record support to the 10-inch position and turn the changer on. Observe the landing of the pickup arm on the record. By turning the eccentric pin (18), it gives the pickup arm a small horizontal movement. However, if a large adjustment is necessary, due to the looseness of the set screw (42A) in the sweep lever (42), the following adjustment is necessary. Remove the power plug, trip the changer by pulling on the switch plate (31). Rotate the turntable in a clockwise direction until the pickup arm starts to drop to the record. At this point the sweep lever (42) is securely held by the 10-inch index groove in the main cam. Loosen the set screw (42A) so the support rod (27A) is free to turn. Move the pickup arm over the starting groove of the record and hold it in this position while tightening the set screw. A minor adjustment may now be made by the eccentric pin (18).

Pickup Arm Height

When the pickup arm is in proper adjustment the needle should clear a stack of twelve 10-inch records. To vary the height of the pickup arm, on units of early production, loosen the set screw (42A) and raise the shaft (27A). If a large adjustment is necessary it will probably be found that the lift and sweep lever assembly (42) is bent out of shape.

In later models the pickup arm support (27A) has been modified to permit bending of the ball tip for adjustment of pickup arm height.

If the pickup arm is set too high to play the first record, turn the set screw (37A), which is located directly behind the pickup arm in the base plate, in a counterclockwise direction to lower the arm.

Record Support Adjustment

Correct adjustment of the record support (5) is, when a record is aligned with the lower part of the spindle (56), the edge of the record should clear the record support (5) by approximately 1/64", i.e., with the record support in the correct position for the size of record to be played. To vary the clearance for 10-inch records, adjust set screw (7), located on the bottom of the record support; for 12-inch records, adjust screw (7A).

Spindle Alignment

The eccentric cam (63) should be aligned with the lower part of the spindle (56) when the changer is out of cycle. To adjust, rotate the pinion (67) until the detent spring (71) engages the detent in the pinion, loosen the set screws (68), align the eccentric (63) with the spindle (56), and tighten the set screws.

The spindle cap (56A) should be in a position so that the slide is facing the center of the record support (5). To align the spindle cap, loosen the set screw (70), turn the spindle cap to its correct position, and tighten the set screw. There should be approximately .005" total vertical play in the spindle assembly to prevent binding.

Ten-Inch and Twelve-Inch Indexing Adjustment

When the record support (5) is in the 12-inch position, the spring plate on the end of the actuating lever (49) is elevated so that it does not contact and move the frog (58A), leaving it in an inward position. When the record support is in the 10-inch position, the spring plate on the

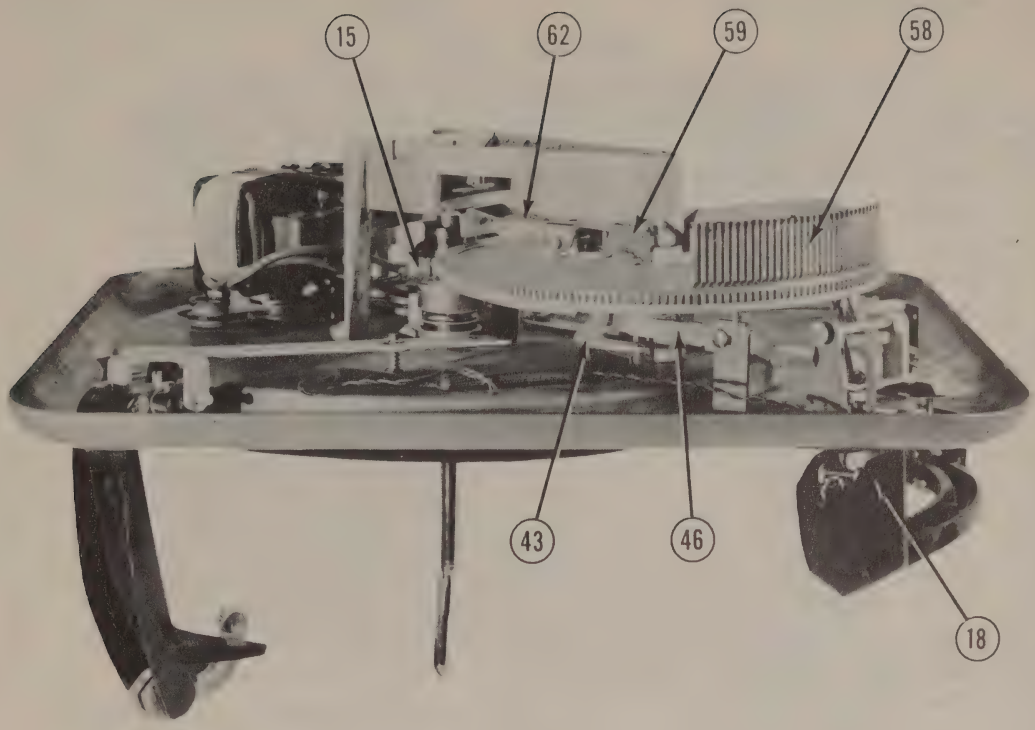


FIG. 5—REAR VIEW

actuating lever is in a lowered position, thereby moving the frog outward as it comes in contact with the spring. The frog is so constructed that it will be reset in the 12-inch position each time the sweep lever pin goes past it. If necessary, the plate should be bent into the correct position to meet these requirements.

TROUBLES

Records Do Not Drop to Turntable When Changer Cycles

1. Check the thickness of the record.
2. Spindle out of alignment. See "Spindle Alignment" under Adjustments.
3. Check the record support for proper adjustment. See "Record Support Adjustment."
4. Pinion (67) may be loose on the eccentric shaft (63).

Two Records Drop at a Time

1. Check the thickness of the records. They should not be less than .070" at the center hole.
2. Check the slide in the spindle cap (56A) for binding. The slide, when fully lowered, prevents more than one record from being dropped to the turntable. If slide is in a raised position during cycling, several records may drop at once.
3. Check the record support adjustment.

Failure to Trip

1. Spring (41) on the trip assembly (40) loose.
2. Crescent lever (C) of the trip assembly (40) binding in an outward position. If this is so, the cam trip actuator (59) will not be moved when the trip lever (40) is actuated by the adjustable collar (10).
3. By moving the "V" lever (A), check the trip assembly (40) to see if it rotates freely and does not bind on the reject trip lever (43) or base plate. The friction clutch should not slip when the trip lever moves over its free path.

Continuous Tripping

1. Check the leg on the adjustable collar (10). It should clear the drive pinion (15) by approximately 1/32"; i.e., when the fiber disc on the drive pinion is resting in the cut-out in the main cam.
2. Check spring (12) to see if it is pushing the pinion down as the main cam returns to home position.
3. Check the velocity trip assembly (40) for binding.
4. Check the reject trip lever (43) for binding.
5. Check the changer to see if it is level. A tilted changer may cause it to trip continuously.
6. Check the pinion (15) for binding.

LUBRICATION

Factory lubrication should be sufficient for a long period of service; however, if it becomes necessary to lubricate, do so as follows:

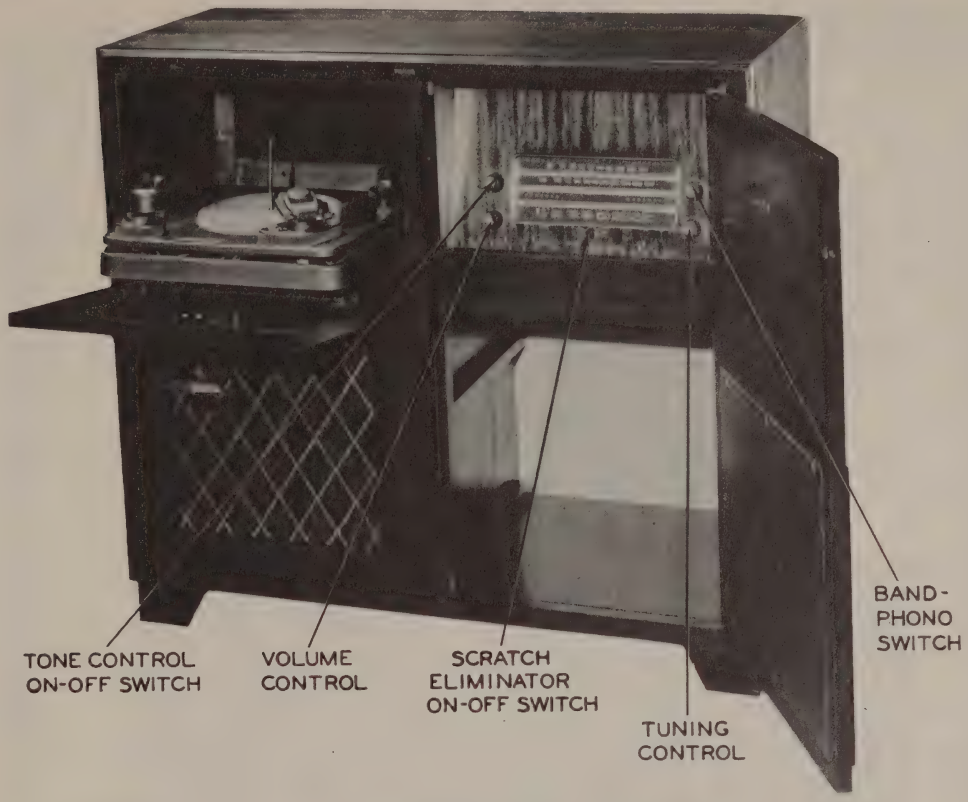
Use light machine oil on all moving parts (where necessary), except the turntable shaft and pinion (15), main cam (58), and the eccentric pinion (67).

Use a good light grease on the turntable shaft and pinion (15); the cam tracks; frog (58A); teeth of the main cam (58); and the detent of the pinion (67).

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	55-73613	Record stabilizer finger
2	33-73349	Spring
3	12-73057	Stud
4	33-73610	Clip
5	62-73620	Record support
6	66A75025	Turntable assembly
7	2087-S	Set screw
7A	2087-S	Set screw
8	33-74543	Spring lock
9	2011-A	Screw
10	65-73595	Driving collar
11	1022-A	Nut
12	33-75452	Pinion spring
13	32-72485	Washer
14	30A72491	Ball bearing assembly
15	28A73704	Pinion assembly
16	1333-A	Screw
17	69-73657	Pickup arm (less crystal)
18	12-75361	Pickup needle index screw
19	33-74053	Spring
20	32-18893	"C" washer
21	32-74055	Flat washer
22	33-73340	Pickup arm cam spring
23	Per Order	Pickup cartridge
24	43-73113	Pickup arm top cam
24A	1417-A	Screw
25		Needle screw
26	1338-A	Cartridge screw
27	43-73069	Pickup arm button cam
27A	12-72975	Pickup arm support rod
28	37-73772	Grommet
29	1399Y	Screw
30	65-73144	Sleeve
31	10-74368	Switch plate
32	58-73096	On-off switch
32A	1398-Y	Screw
33	57A73290	Base plate
34	1906-C	Lock washer
35	1022-A	Nut
36	12-73007	Hinge bracket pivot pin
37	10-73132	Pickup arm hinge bracket
37A	2073-Z	Pickup arm height adjusting screw
38	32-16901	"C" washer
39	32-16901	"C" washer
40	55A74635	Velocity trip assembly
41	37-75158	Crescent spring
42	55A73045	Lift and sweep lever assembly
42A	2089-S	Set screw
43	55-73102	Reject trip lever
44	1201-A	Speed nut
45	33-71342	Spring
46	33-72963	Ground spring
46A	1028-A	Nut
46B	1311-A	Screw
47	1612-A	Flat washer
48	33-73889	Compression spring
49	55-73884	Actuating lever 10-inch
50	32-16901	"C" washer
51	12-73007	Pivot pin
52	56-73555	Motor
52A		Idler wheel (part of item 52)
53	32-16901	"C" washer
54	37-73031	Snap fastener
55	37-73031	Snap fastener
56	19A75358	Spindle assembly
56A	21A73601	Spindle cap assembly
57	65-75007	Lower bearing sleeve
58	43A75411	Cam and frog assembly
59	55-75142	Cam trip actuator
60	33-73577	Compression spring
61	12-73568	Actuating pin
62	55A74813	Actuating lever assembly
63	43A72960	Eccentric assembly
64	10A75238	Positioning bracket sub assembly
65	1932-C	Lock washer
66	1042-A	Nut
67	28-73084	Pinion
68	2079-S	Screw
69	32-73301	Spindle cap rod retainer
70	1344-A	Screw
71	33-73135	Detent spring

PHILCO
MODELS 49-1613, 50-1726



PHILCO
MODELS 49-1613, 50-1726

PHILCO MODEL 49-1613

TRADE NAME	Philco, Model 49-1613, 50-1726
MANUFACTURER	Philco Corp., Tioga and "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(ELEVEN)	Types 6AU6 FM RF Amp., 7F8 Converter, 6BA6 1st IF Amp., 7R7 Limiter-AM 2nd IF-DET-AVC, 7X7 Ratio Det.-AF Amp., 6J5GT Phase Inverter, (2) 6K6GT or 6V6GT Power Output, 7F7 Phono Scratch Amp., 7E7 Phono Reactance Control, 5AZ4 Rectifier.
POWER SUPPLY	105-120 Volts AC RATING .83 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1720KC FREQ. MOD. 88-108MC

RECORD CHANGER M-12C (MODEL 49-1613), M-20 (MODEL 50-1726)

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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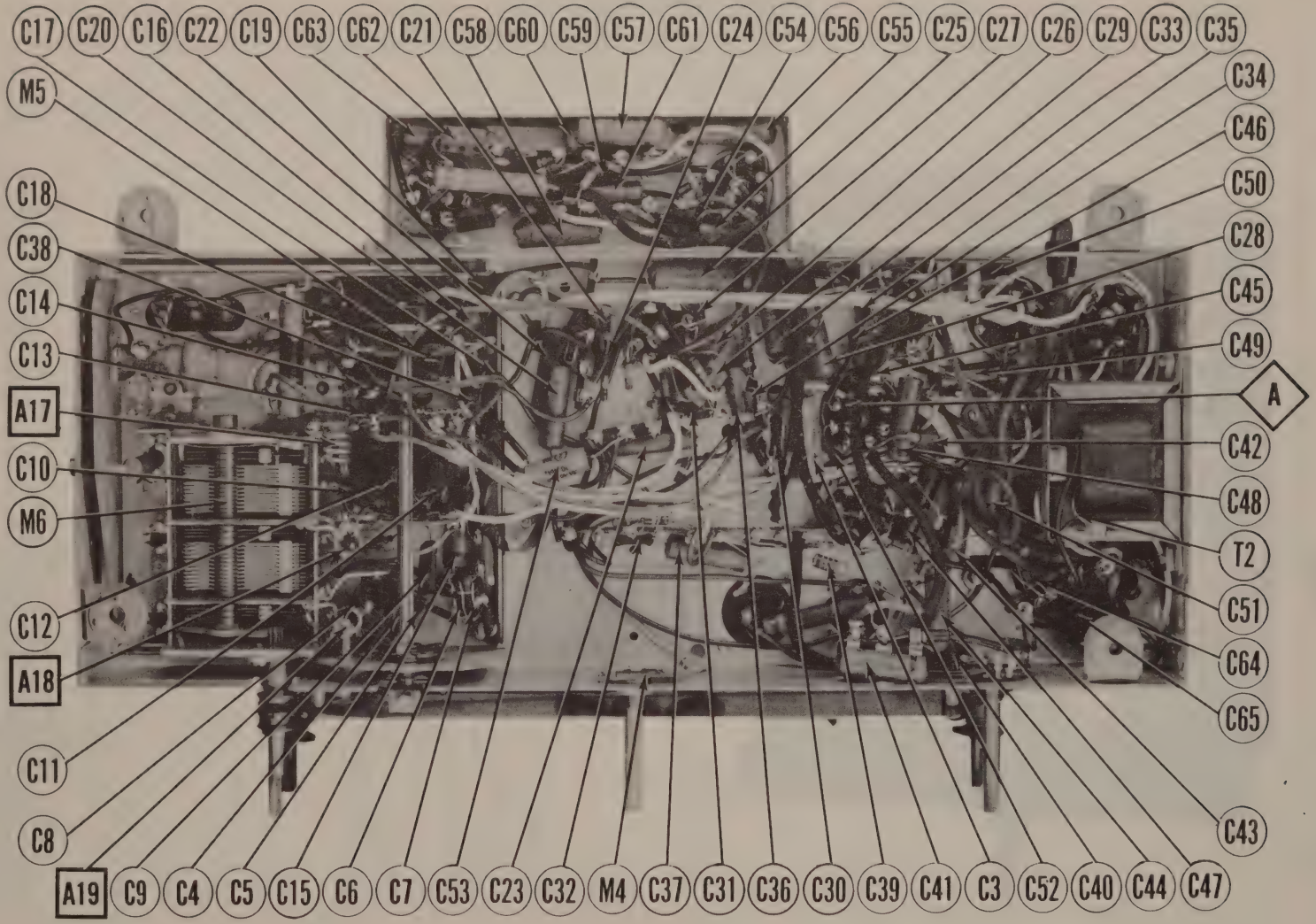
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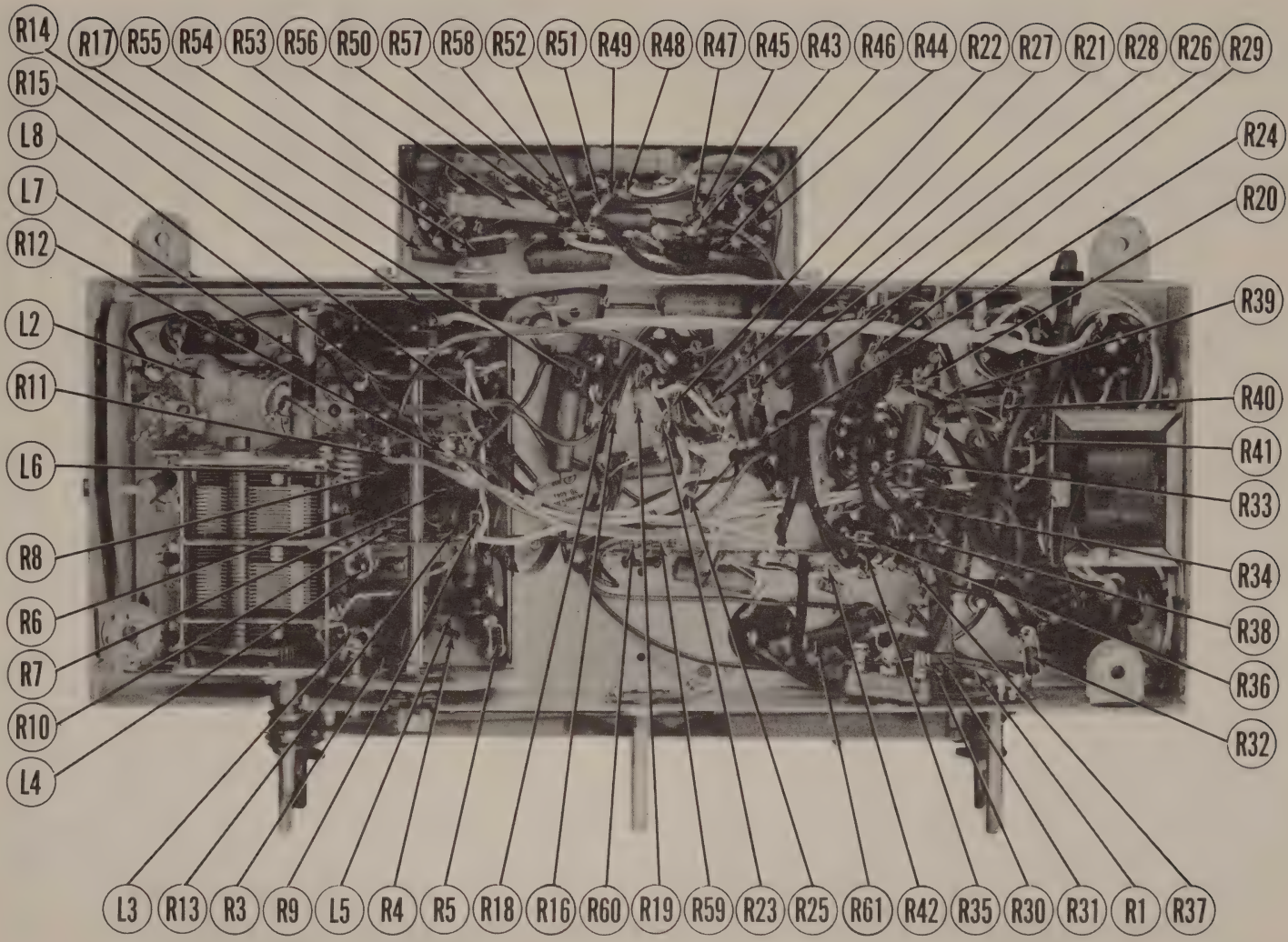


PHILCO
MODELS 49-1613, 50-1726

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	FM RF Amp.	6AU6	6AU6	7BK	
V2	Converter	7F8	7F8	8BW	
V3	1st IF Amp.	6BA6	6BA6	7BK	
V4	Limiter-2nd AM IF Amp.-DET.-AVC	7R7	7R7	8AE	
V5	Ratio Det.-AF Amp.	7X7	7X7	8BZ	
V6	Phase Inv.	6J5GT	6J5GT	6Q	
V7A	Power Output	6K6GT	6K6GT	7S	
B	Power Output	6V6GT	6V6GT	7AC	
V8A	Power Output	6K6GT	6K6GT	7S	
B	Power Output	6V6GT	6V6GT	7AC	
V9	Phono Scratch Amp.	7F7	7F7	8AC	
V10	Phono Reactance Cont.	7E7	7E7	8AE	
V11	Rectifier	5AZ4	5AZ4	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	20	450	30-2568-8	AF4J		EL-2	Filter
C2A	25	450	30-2556	AF2222J*		EL-410*	▲ Filter
B	10	450					▲ Filter
C3	2	50	30-2417-9	E26E6		TVA-12	Stabilizing Cap.
C4	100		62-110009001	GP100M	GP1K-100	1FM-31	RF Cathode Bypass
C5	100		62-110009001	GP100M	GP1K-100	1FM-31	RF Screen Bypass
C6	1500		62-215001011	GP1500M	GP2L-0015	1FM-215	RF Bypass
C7	1500		62-215001011	GP1500M	GP2L-0015	1FM-215	RF Plate Decoupling
C8	100		62-110009001	GP100M	GP1K-100	1FM-31	RF Filament Bypass
C9	33	500	30-1224	1468-00004	GP1K-33	1FM-44	RF Coupling
C10	220		62-122001001	GP220M	GP2K-220	1FM-325	RF Coupling
C11	750	500	60-10755301	1468-00075	GP2K-750	1FM-37	Conv. Cathode Bypass
C12	100		62-110009001	GP100M	GP1K-100	1FM-31	Osc. Grid Cap.
C13	250		62-122001001	GP250M	GP2K-250	1FM-325	Osc. Feedback
C14	100		62-110009001	GP100M	GP1K-100	1FM-31	Conv. Filament Bypass
C15	.01	600	61-0120	P688-01	821-01	TM-11	Conv. Plate Decoupling
C16	.01	400	61-0120	P488-01	821-01	TM-11	AVC Filter
C17	100		62-110009001	GP100M	GP1K-100	1FM-31	AVC Filter
C18	.01	400	61-0120	P488-01	821-01	TM-11	1st IF Screen Bypass
C19	100		62-110009001	GP100M	GP1K-100	1FM-31	1st IF Fil. Bypass
C20	.01	400	61-0120	P488-01	821-01	TM-11	1st IF Decoupling
C21	100		62-110009001	GP100M	GP1K-100	1FM-31	1st IF Decoupling
C22	.01	400	61-0120	P488-01	821-01	TM-11	RF Bypass
C23	.01	400	61-0120	P488-01	821-01	TM-11	AVC Filter
C24	220		62-122001001	GP220M	GP2K-220	1FM-325	2nd IF Grid Filter
C25	.05	400	61-0122	P488-05		TM-15	2nd IF Cath. Bypass
C26	.01	400	61-0120	P488-01	821-01	TM-11	2nd IF Screen Bypass
C27	100		62-110009001	GP100M	GP1K-100	1FM-31	2nd IF Fil. Bypass
C28	.05	400	61-0122	P488-05		TM-15	2nd IF Plate Decoupling
C29	100	500	60-10105407	1468-0001	GP1K-100	1FM-31	IF Coupling
C30	100		62-110009001	GP100M	GP1K-100	1FM-31	Diode RF Filter
C31	100		60-10105407	GP100M	GP1K-100	1FM-31	Diode RF Filter
C32	100		60-10105407	GP100M	GP1K-100	1FM-31	RF Bypass
C33	.008	400	30-4112	P488-0075	811-0075	MB-28	De-emphasis
C34	100		60-10105407	GP100M	GP1K-100	1FM-31	RF Bypass
C35	100		60-10105407	GP100M	GP1K-100	1FM-31	RF Bypass
C36	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling
C37	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling
C38	100		62-110009001	GP100M	GP1K-100	1FM-31	RF Bypass
C39	100		60-1055407	GP100M	GP1K-100		Tone Compensation-See Note 3
C40	100	500	60-10105407	1468-0001	GP1K-100	1FM-31	Tone Compensation
C41	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling
C42	100	500	60-10105407	1468-0001	GP1K-100	1FM-31	AF Amp. Plate Bypass
C43	.006	400	60-0120	P488-006	GP2M-0056	TM-26	Tone Compensation-See Note 1

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R31	4.7Ω	½	66-9473340	BW-½-4.7	Feedback Wire Wound
R32	68Ω	½	66-0683340	BW-½-68	Feedback Wire Wound
R33	10 Meg.	½	66-6103340	BTS-10 Meg.	AF Grid
R34	220KΩ	½	66-4223340	BTS-220K	AF Plate
R35	1 Meg.	½	66-5103340	BTS-1 Meg.	Phase Inv. Grid
R36	4700Ω	½	66-2473340	BTS-4700	Phase Inv. Cathode
R37	47KΩ	½	66-3473340	BTS-47K	Phase Inv. Cathode
R38	56KΩ	½	66-3563340	BTS-56K	Phase Inv. Plate
R39	330KΩ	½	66-4333340	BTS-330K	Output Grid
R40	330KΩ	½	66-4333340	BTS-330K	Output Grid
R41	150KΩ	½	66-4153340	BTS-150K	Bias Network
R42	47KΩ	½	66-3473340	BTS-47K	Low Pass Filter
R43	1 Meg.	½	66-5103340	BTS-1 Meg.	Phono Scratch Amp. Grid
R44	2200Ω	½	66-2223340	BTS-2200	Phono Scratch Amp. Cathode
R45	560KΩ	½	66-4563340	BTS-560K	Phono Scratch Amp. Grid
R46	220KΩ	½	66-4223340	BTS-220K	Phono Scratch Amp. Plate
R47	100KΩ	½	66-4103340	BTS-100K	Phono Scratch Amp. Plate
R48	220KΩ	½	66-4223340	BTS-220K	Bias Network
R49	220KΩ	½	66-4223340	BTS-220K	Diode Load
R50	560KΩ	½	66-4563340	BTS-560K	Bias Network
R51	1.5 Meg.	½	66-5153340	BTS-1.5 Meg.	Bias Network
R52	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Bias Network
R53	1 Meg.	½	66-5103340	BTS-1 Meg.	Phono Reactance Control Grid
R54	33KΩ	1	66-3333340	BTA-33K	Phono Reactance Control Screen
R55	33KΩ	1	66-3333340	BTA-33K	Voltage Divider
R56	18KΩ	2	66-3185340	BT-2-18K	Phono Reactance Control Plate
R57	220KΩ	½	66-4223340	BTS-220K	Bias Network
R58	680KΩ	½	66-4683340	BTS-680K	Bias Network
R59	680KΩ	½	66-4683340	BTS-330K	Bias Network
R60	330KΩ	½	66-4333340	BTS-330K	Bias Network See Note 2
R61	15KΩ	2	66-3155340	BT-2-15K	Filter
R62	47KΩ	½	66-3478340	BTS-47K	Feedback Network See Note 3
R63	2.2 Meg.	½	66-5228340	BTS-2.2 Meg.	Feedback Network See Note 3

Note 1. Some models use 1500Ω resistor in this application.
Note 2. Some models use 680KΩ resistor in this application.
Note 3. Used in model 50-1726 only.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T1	700VCT at .78A	5VAC at 2A	6.3VAC at 3.1A	6.3VAC at .6A	32-8248			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T2	8.2KΩ	3.7Ω	280Ω	.5Ω	32-8274	A-3824	A-2936 †	R-305	† Drill new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.				
SP1	650Ω	3.7Ω	36-1611-3		12E60	
	CONE DIA.	V. C. DIA.				
SP2	11 1/2"	1"				

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C44	.006	400	45-3500-7	P488-006	GP2M-0056	TM-26	Tone Compensation
C45	100		62-110009001	GP100M	GP1K-100	1FM-31	Ratio Det.-AF Fil. Bypass
C46	100		62-110009001	GP100M	GP1K-100	1FM-31	Ratio Det.-AF Fil. Bypass
C47	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling
C48	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling-See Note 2
C49	.006	400	45-3500-7	P488-006	811-005	TM-26	Audio Coupling-See Note 2
C50	.003	1000	61-0117	P1088-003		MB-23	Output Plate Bypass
C51	.05	400	61-0113	P488-05		TM-15	Bias Filter-See Note 2
C52	7.5		30-1224-8				Balancing
C53	.01	400	30-4641	P488-01	821-01	TM-11	RF Bypass
C54	150	500	60-10155407	1468-00015	GP2K-150	1FM-315	Audio Coupling
C55	330	500	60-10335407	1468-00035	GP2K-330	1FM-335	Audio Coupling
C56	.01	400	61-0120	P488-01	821-01	TM-11	Bias Filter
C57	.02	400	61-0108	P488-02		TM-12	Bias Filter
C58	.03	400	30-4517	P488-03		TM-13	Bias Filter.
C59	.002	600	30-4622	P688-002	GP2M-002	TM-22	Audio Coupling
C60	.03	400	30-4517	P488-03		TM-13	Bias Filter
C61	.01	400	61-0120	P488-01	821-01	TM-11	Bias Filter
C62	330	500	60-10335407	1468-00035	GP2K-330	1FM-335	Audio Coupling
C63	.001	600	30-4620	P688-001	GP2L-001	TM-21	Audio Coupling
C64	.01	400	30-1226-1	P688-01	821-01	TM-11	Line Filter
C65	.01	400	30-1226-1	P688-01	821-01	TM-11	Line Filter
C66	.015	400	45-3505-59	P488-015		MB-115	Feedback Filter-See Note 4

* Parallel sections to obtain desired capacity.
Note 1. Some models use .01MFD in this application.
Note 2. Some models use .1MFD in this application.
Note 3. Not used in model 50-1726.
Note 4. Not used in model 49-1613.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	2 Meg.	½	33-5535-1	Q18-139X	T-116	Volume control, tapped at 1 Meg.
R2	6 Meg.	½	33-5538-1			Tone control and switch

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	IDENTIFICATION CODES
R3	82Ω	½	66-0823340		FM RF Cathode
R4	33KΩ	½	66-3333340	BTS-33K	FM RF Screen
R5	1000Ω	½	66-2103340	BTS-1000	FM RF Plate Decoupling
R6	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Conv. Grid
R7	2200Ω	½	66-2223340	BTS-2200	Conv. Cathode See Note 1
R8	15KΩ	½	66-3153340	BTS-15K	Osc. Grid
R9	47KΩ	½	66-3473340	BTS-47K	Conv. Plate Decoupling
R10	470KΩ	½	66-4473340	BTS-470K	AVC Network
R11	4700Ω	½	66-2473340	BTS-4700	Osc. Plate
R12	33KΩ	½	66-3333340	BTS-33K	Osc. Plate
R13	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	AVC Network
R14	68Ω	½	66-0683340		1st IF Cathode
R15	27KΩ	½	66-3273340	BTS-27K	1st IF Screen
R16	1000Ω	½	66-2103340	BTS-1000	1st IF Plate Decoupling
R17	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	2nd IF Grid
R18	150Ω	½	66-1153340		2nd IF Cathode
R19	68KΩ	½	66-3683340	BTS-68K	2nd IF Screen
R20	1000Ω	½	66-2103340	BTS-1000	2nd IF Plate Decoupling
R21	330KΩ	½	66-4333340	BTS-330K	Voltage Divider
R22	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	AVC Network
R23	1 Meg.	½	66-5103340	BTS-1 Meg.	Diode Load
R24	47KΩ	½	66-3473340	BTS-47K	Diode Filter
R25	100KΩ	½	66-4103340	BTS-100K	AVC Network
R26	100KΩ	½	66-4103340	BTS-100K	Series Test Terminal
R27	6.8 Meg.	½	66-5683340	BTS-6.8 Meg.	Disc. Diode Load
R28	100KΩ	½	66-4103340	BTS-100K	De-emphasis
R29	47KΩ	½	66-3473340	BTS-47K	Disc. Diode Load
R30	33KΩ	½	66-3333340	BTS-33K	Tone Compensation

SET 91 FOLDER 9

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	MEISSNER PART No.	
L1	AM Loop Antenna	0Ω		76-3583-6		1 turn of #10 Wire around cabinet.
L2	AM Antenna	1.8Ω		32-4049-3		
L3	FM Antenna	0Ω		32-4158		
L4	FM RF Coil	0Ω		32-4159		
L5	RF Choke	.5Ω		32-4061-2		
L6	FM Osc. Coil	0Ω		32-4018-2		
L7	AM Osc. Coil	3.2Ω		32-4221	14-1060	
L8	Par. Supp.	0Ω		32-4157		
L9A	1st IF FM	1.2Ω	1.2Ω	32-4146		
B	1st IF AM	1.5Ω	20Ω			
L10	2nd IF FM-AM	6Ω $	11Ω #	32-4156		$ Includes both primaries
L11A	Ratio Det.	11Ω $	1Ω	32-4147		# Includes both secondaries
B	3rd AM IF		10Ω			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA m PHILCO PART No.		NOTES
M1	Bayonet	6-8	.25	Blue	34-2064		Type #44
M2	Bayonet	6-8	.25	Blue	34-2064		Type #44

PHONO CARTRIDGE and NEEDLE

ITEM No.	REPLACEMENT DATA PHILCO PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	REMARKS
M3A	35-2691-1	LT-2M	TM	W61B	A62A	Model 49-1613 (Standard)
	45-1612	U-J	UJ			Model 49-1613 (Long Play)
B	76-4649					Model 50-1726

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M4A	Switch	42-1848	Scratch Eliminator On-Off (Model 39-1613)
B	Switch	42-1848-1	Scratch Eliminator On-Off (Model 50-1726)
M5A	Switch	42-1603-1	Band-Phono (Model 49-1613)
B	Switch	42-1803-2	Band-Phono (Model 50-1726)
M6A	2 Gang Var. Cap.	31-2703-2	(18-514MMF, 18-514MMF) Model 49-1613
B	2 Gang Var. Cap.	31-2703-6	Model 50-1726
	Dial Scale	76-3187-1	Model 49-1613
	Dial Scale	76-3187-6	Model 50-1726
	Dial Pointer	56-3179FCP	Model 49-1613
	Dial Pointer	56-3179	Model 50-1726

PHILCO
MODELS 49-1613, 50-1726

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

When complete receiver alignment is to be performed it should be done in the order given. Alignment of the AM IF system will necessitate alignment of the FM IF system.

To set dial pointer turn the tuning gang fully closed and set the pointer 1-11/16 inches to the right of the notch in the upper left hand end of the dial backplate.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to term. #1 of antenna terminal strip. Low side to chassis.	455KC (400∿ Mod.)	AM (max. CCW)	Tuning gang fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	580KC	"	580KC (2-9/16 inches to the right of notch in dial back-plate). See pre-alignment instructions.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Rock tuning gang while adjusting A5 for maximum output.
3.		Loop	1700KC	"	1700KC (8-1/16 inches to right of notch in dail backplate)	"	A6	Use the loop as in step 2. Adjust for maximum output.
4.		Loop	1500KC	"	1500KC (7-7/16 inches to right of notch in dial backplate)	"	A7	Use the loop as in step 2. Adjust for maximum output. Repeat steps 2, 3 and 4 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from point A to chassis. The junction of these two resistors is alignment point B as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.1MFD	High side to pin 1 (Grid) of 6BA6 (V3). Low side to chassis.	9.1MC (Unmod.)	FM (center pos.)	Tuning gang fully closed	DC Probe to Point (A) Common to chassis.	A8, A9, A10	Adjust for maximum deflection.
6.	.1MFD	"	"	"	"	DC Probe to "FM test jack:" Common to Point (B)	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
7.	.1MFD	High side to pin 8 (Grid) of 7F8 (V2). Low side to chassis.	"	"	"	DC Probe to Point (A) Common to chassis.	A12, A13	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.1MFD	High side to pin 1 (Grid) of 6BA6 (V3). Low side to chassis.	9.1MC (450KC Sweep)	FM (center pos.)	Point of non-interference	Vert. Amp. to Point (A) Low side to chassis.	A8, A9, A10	Disconnect stabilizer capacitor (C3). Adjust for maximum amplitude and symmetry as per Fig 1.
6.	.1MFD	High side to pin 8 (Grid) of 7F8 (V2). Low side to chassis.	"	"	"	"	A12, A13	"
7.	.1MFD	"	"	"	"	Vert. Amp. to "FM test jack." Low side to chassis.	A11, A8	Reconnect capacitor C3. Adjust A11 so 9.1MC occurs at center of crossover lines as per Fig 2. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

The signal generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side to term. "4" of antenna jack. Low side to chassis.	105MC (Unmod.)	FM	105MC (6-13/16 ins. to right of notch in dial backplate, see pre-alignment instructions.)	DC Probe to Point (A) Common to chassis.	A14, A15 A16	Adjust for maximum deflection. Rock tuning gang while adjusting A15.
9.	"	"	92MC	"	92MC (3-7/16 ins. to right of notch in dial back-plate.)	"	A17, A18 A19	Expand or compress coil turns for maximum deflection. Repeat steps 8 and 9 until no further improvement can be made.

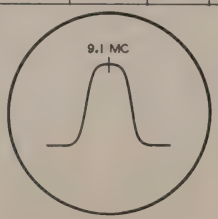


FIG. 1

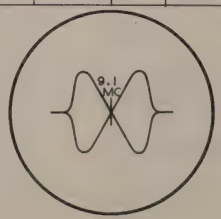
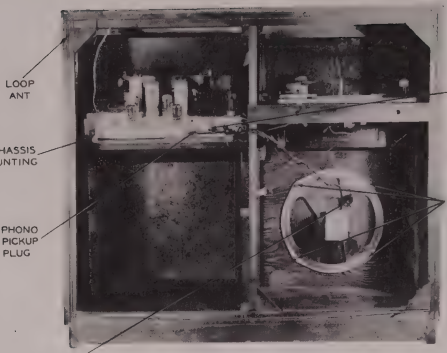
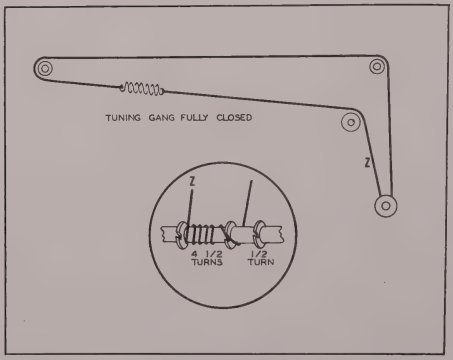


FIG. 2

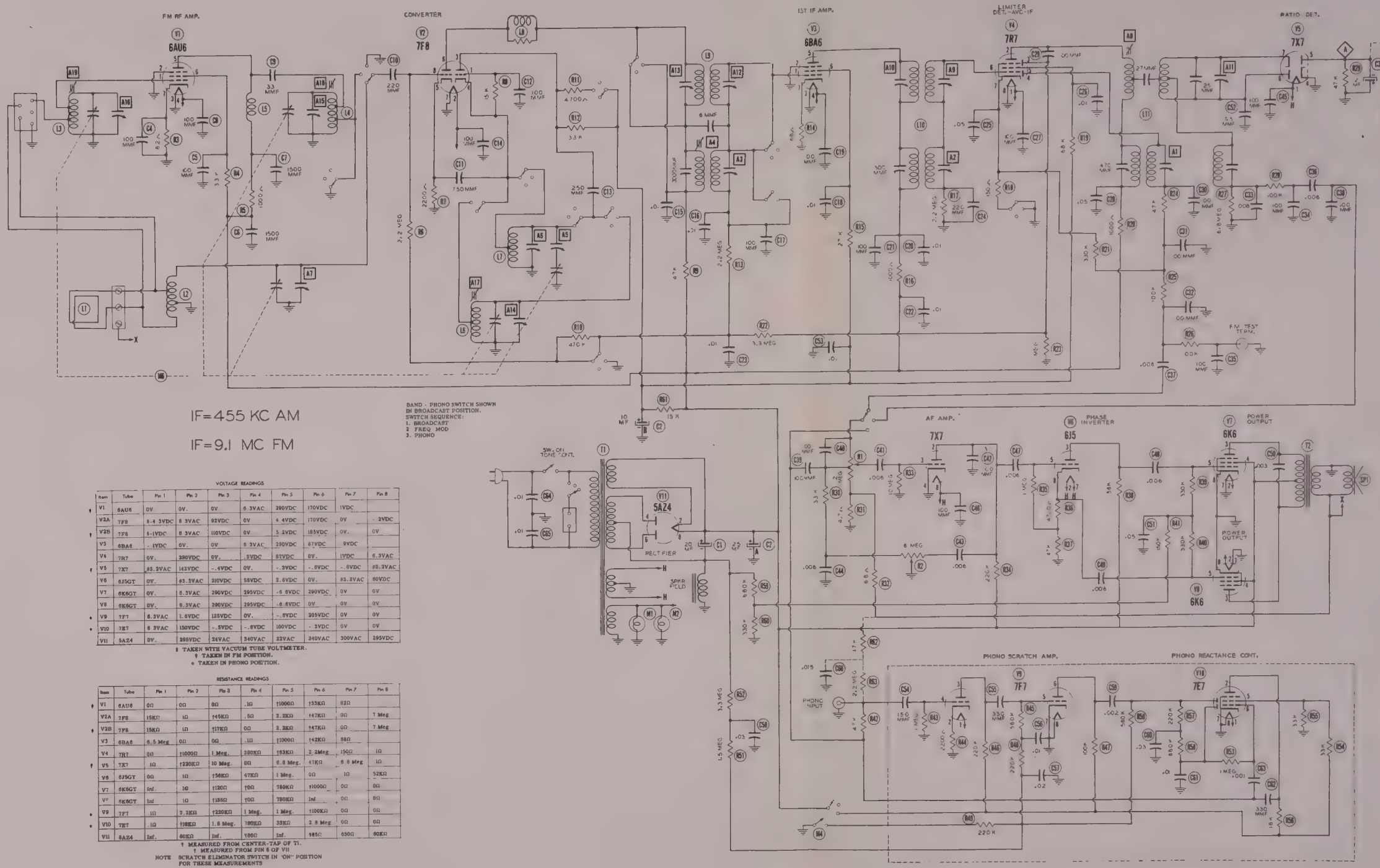


DISASSEMBLY INSTRUCTIONS MODEL 49-1613

1. Remove 5 push-on type control knobs.
2. Remove 15 Phillips-head screws holding rear cover. Remove cover.
3. Remove phono audio and power plugs from rear of receiver chassis.
4. Remove speaker plug from speaker.
5. Looses antenna terminal screws. Remove antenna lead lugs.
6. Remove four 3/8 inch hex head bolts holding receiver chassis. Remove chassis.
7. Remove four 3/8 inch hex head nuts holding speaker. Rmove speaker.



DIAL CORD DRIVE



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
† V1	6AU6	0V	0V.	0V	6.3VAC	290VDC	170VDC	1VDC	
V2A	7F8	6.4 3VDC	6.3VAC	92VDC	0V	4.4VDC	170VDC	0V	- 2VDC
† V2B	7F8	6.1VDC	6.3VAC	116VDC	0V	5.2VDC	185VDC	0V.	0V
V3	6BA6	- 1VDC	0V.	0V	6.3VAC	290VDC	67VDC	9VDC	
V4	7R7	0V.	290VDC	0V.	.3VDC	87VDC	0V.	1VDC	6.3VAC
† V5	7X7	63.2VAC	142VDC	-.6VDC	0V.	-.3VDC	-.5VDC	-.6VDC	63.2VAC
V6	6J5GT	0V.	63.2VAC	210VDC	55VDC	3.6VDC	0V.	63.2VAC	80VDC
V7	6K6GT	0V.	6.3VAC	290VDC	295VDC	-6.6VDC	290VDC	0V	0V
V8	6K6GT	0V.	6.3VAC	290VDC	295VDC	-6.6VDC	0V	0V	0V
• V9	7F7	6.3VAC	1.6VDC	125VDC	0V.	-.8VDC	205VDC	0V	0V
• V10	7E7	6.3VAC	150VDC	-.5VDC	-.6VDC	100VDC	- 3VDC	0V	0V
V11	5AZ4	0V.	295VDC	24VAC	340VAC	22VAC	340VAC	300VAC	295VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER.
† TAKEN IN FM POSITION.
• TAKEN IN PHONO POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
† V1	6AU6	0Ω	0Ω	0Ω	.1Ω	†1000Ω	†33KΩ	82Ω	
V2A	7F8	15KΩ	1Ω	†45KΩ	.5Ω	2.2KΩ	†47KΩ	0Ω	7 Meg
† V2B	7F8	15KΩ	1Ω	†17KΩ	0Ω	2.2KΩ	†47KΩ	0Ω	7 Meg
V3	6BA6	6.5 Meg	0Ω	0Ω	.1Ω	†1000Ω	†42KΩ	58Ω	
V4	7R7	0Ω	†1000Ω	1 Meg.	390KΩ	†83KΩ	2.2Meg	†50Ω	1Ω
† V5	7X7	1Ω	†220KΩ	10 Meg.	0Ω	6.8 Meg.	47KΩ	6.8 Meg	1Ω
V6	6J5GT	0Ω	1Ω	†56KΩ	47KΩ	1 Meg.	0Ω	1Ω	52KΩ
V7	6K6GT	Inf.	1Ω	†120Ω	†0Ω	780KΩ	†1000Ω	0Ω	0Ω
V8	6K6GT	Inf	1Ω	†185Ω	†0Ω	780KΩ	Inf	0Ω	0Ω
• V9	7F7	1Ω	2.2KΩ	†220KΩ	1 Meg.	1 Meg.	†100KΩ	0Ω	0Ω
• V10	7E7	1Ω	†18KΩ	1.8 Meg.	780KΩ	33KΩ	2.8 Meg	0Ω	0Ω
V11	5AZ4	Inf.	60KΩ	Inf.	†80Ω	Inf.	185Ω	850Ω	60KΩ

† MEASURED FROM CENTER-TAP OF T1.
† MEASURED FROM PIN 8 OF V11
NOTE SCRATCH ELIMINATOR SWITCH IN "ON" POSITION FOR THESE MEASUREMENTS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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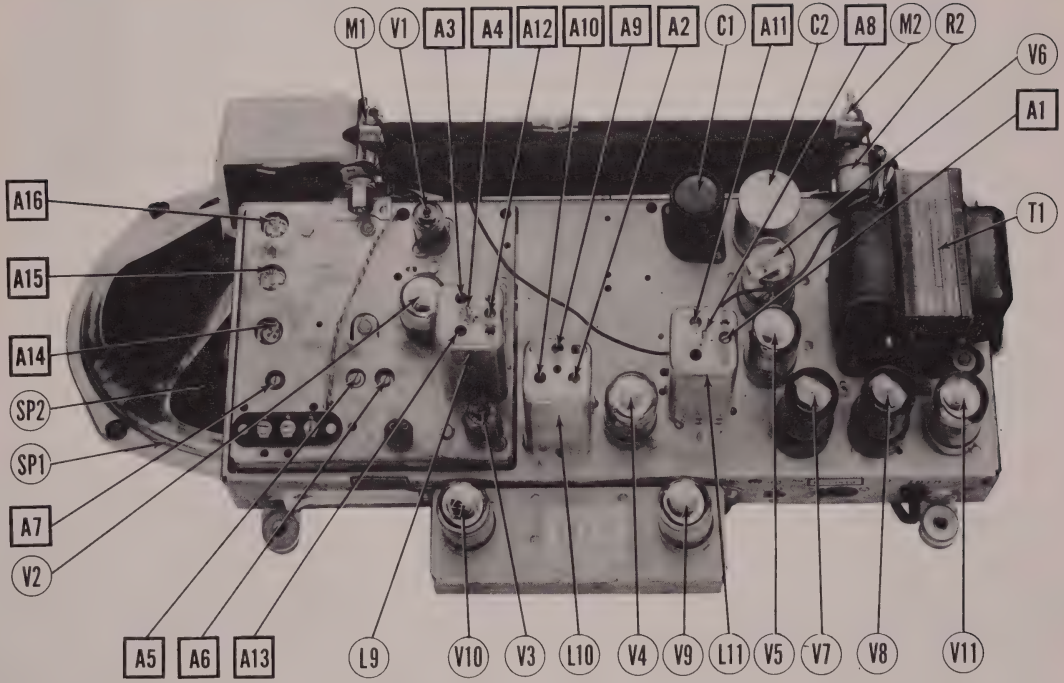
M1
V1
A3
A4
A12
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A9
A2
C1
A11
C2
A8
M2
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T1
A16
A15
A14
SP2
SP1
A7
V2
A5
A6
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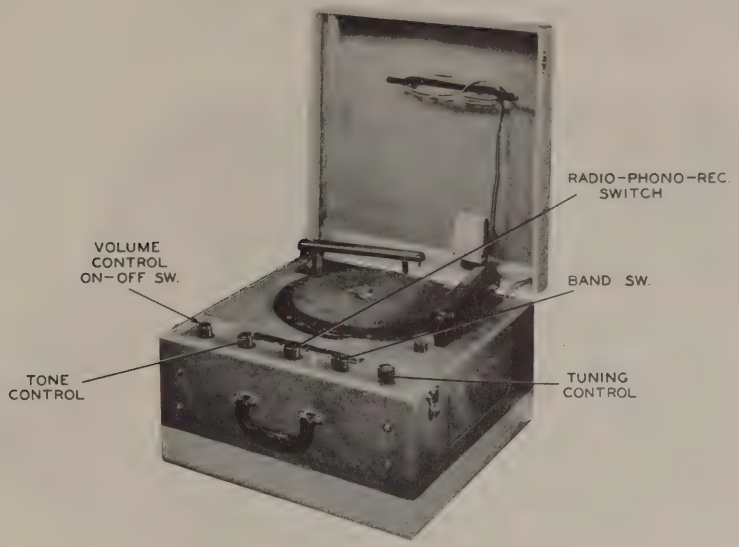
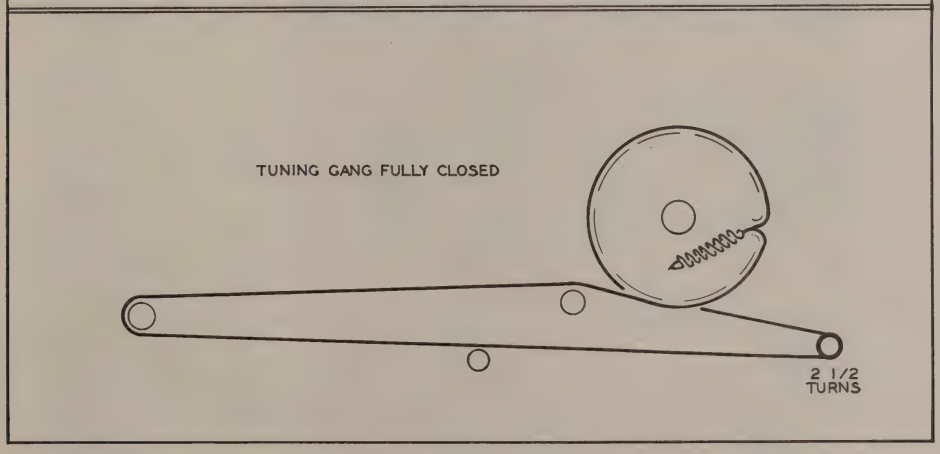
RECORDIO
MODEL 9G10



RECORDIO MODEL 9G10

TRADE NAME	Recordio, Model 9G10		
MANUFACTURER	Wilcox-Gay Corp., Charlotte, Michigan		
TYPE SET	AC Operated Combination Phono-Recorder-Radio, AM-FM Superheterodyne Receiver with Loop Antenna		
TUBES (SEVEN)	Types 12AT7 Converter, 6BA6 1st IF Amp., 6AU6 FM 2nd IF-Mic. Pre Amp., 6AL5 Ratio Det., 6AT6 DET-AVC-AF, 6AQ5 Power Output, 6X5GT Rectifier		
POWER SUPPLY	110-120 Volts AC	RATING	.45 Amp. at 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD.	88-109MC



DIAL CORD DRIVE

RECORDIO
MODEL 9G10

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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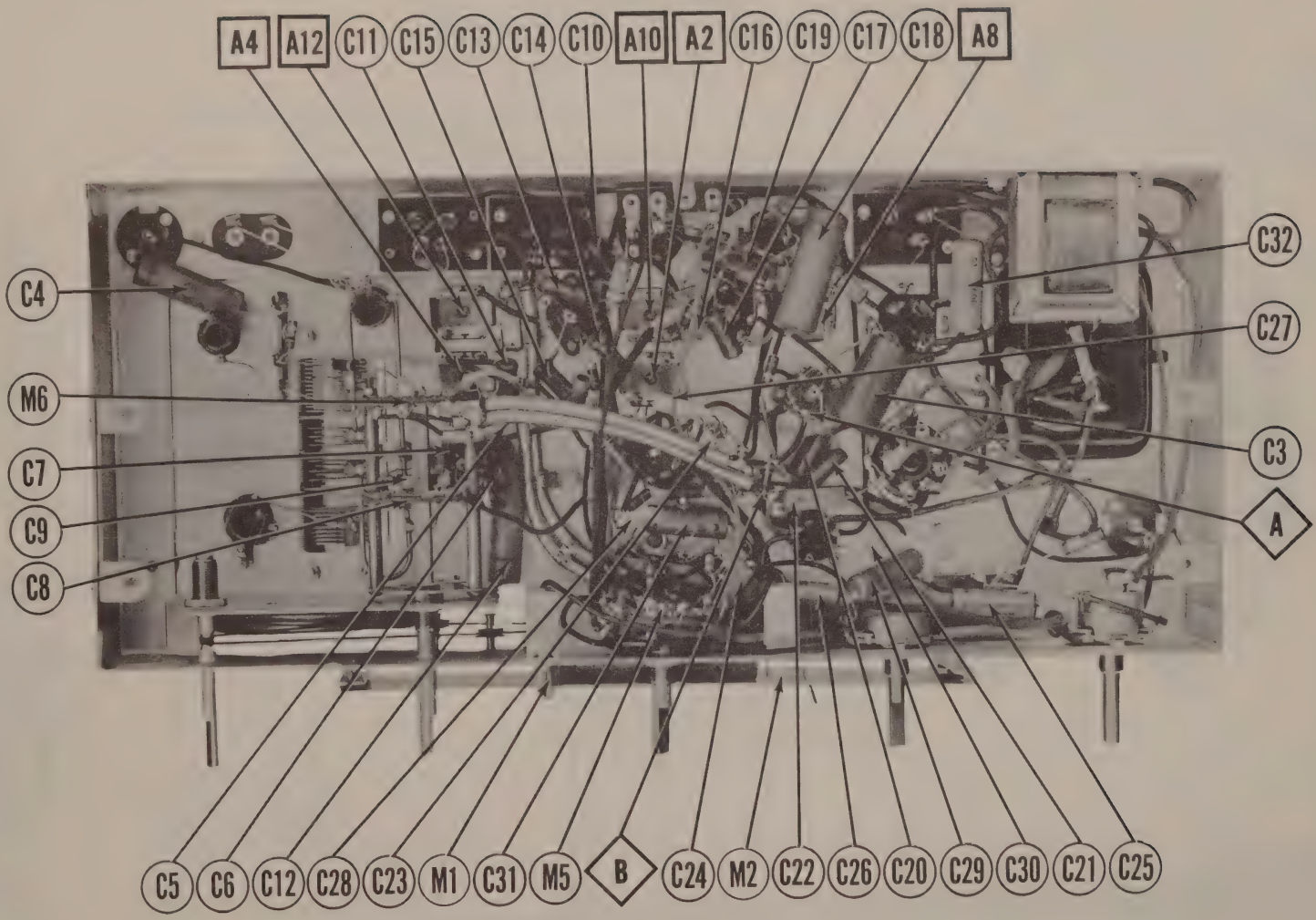
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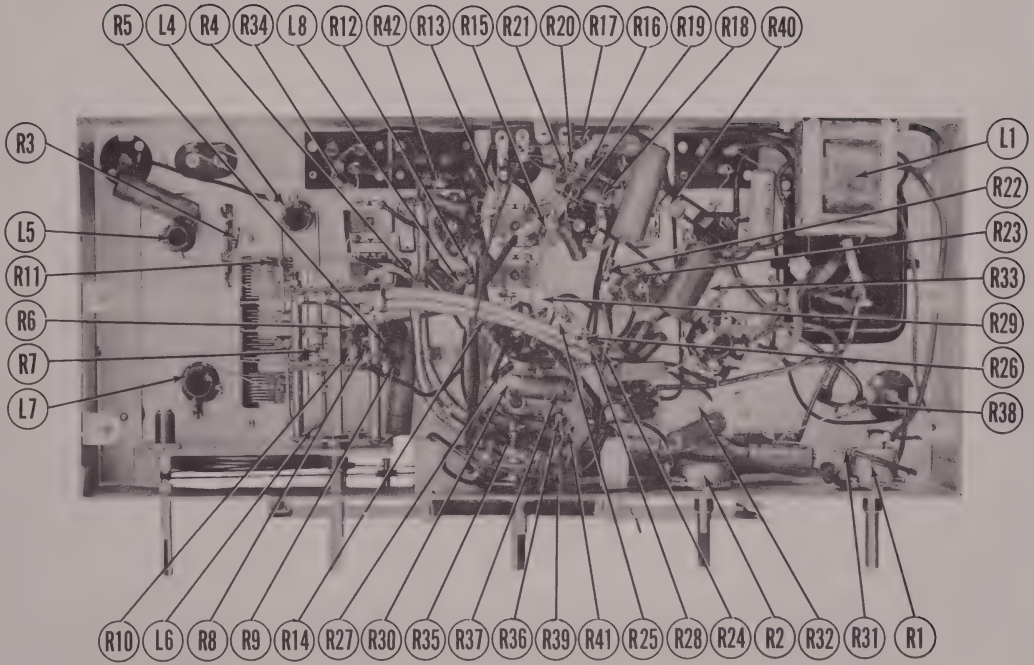
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R33
R29
R26
R38
R10
L6
R8
R9
R14
R27
R30
R35
R37
R36
R39
R41
R25
R28
R24
R2
R32
R31
R1

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Turn the function selector switch to "Radio".

To set dial pointer turn the tuning gang fully closed and set the pointer even with the end of the centerline on the low frequency end of the dial scale.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to stator on rear section of tuning gang. Low side to chassis.	456KC (400 ~ Mod.)	AM (CCW)	1500KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	.05MFD	"	1500KC	"	"	"	A5	"
3.		Loop	1400KC	"	1400KC	"	A6	Replace set in cabinet. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		Loop	600KC	"	600KC	"	A7	Replace set in cabinet. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 3 and 4 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from point A to chassis. The junction of these two resistors is alignment point C as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.05MFD	High side to stator of FM-Ant. section on tuning gang. Low side to chassis.	10.7MC (Unmod.)	FM (CW)	Tuning gang fully open	DC Probe to Point (A) Common to chassis.	A8, A9, A10, A11, A12	Adjust for maximum deflection. Attenuate signal generator to maintain reading of less than 5 volts.
6.	.05MFD	"	"	"	"	DC Probe to Point (B) Common to Point (C)	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to stator of FM-Ant. section on tuning gang. Low side to chassis.	10.7MC (450KC Sweep)	FM (CW)	Point of non-interference	Vert. Amp. to Point (A) Low side to chassis.	A8, A9, A10, A11, A12	Disconnect stabilizer capacitor (C3). Adjust for maximum amplitude and symmetry as per Fig 1.
6.	.01MFD	"	"	"	"	Vert. Amp. to Point (B) Low side to chassis.	A13	Reconnect capacitor C3. Adjust A13 so 10.7MC occurs at center of crossover lines as per Fig 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	Two 150Ω carbon res.	Across FM antenna terminals with 150Ω in each lead.	100MC (Unmod.)	FM	100MC	DC Probe to Point (A) Common to chassis.	A14, A15	Adjust for maximum deflection. If 2 peaks are noted on A14, use the one with least capacity.

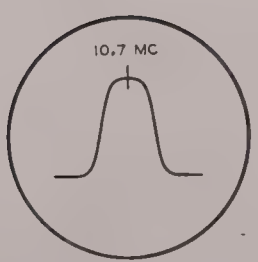


FIG. 1

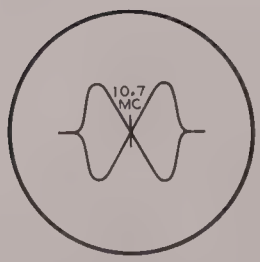
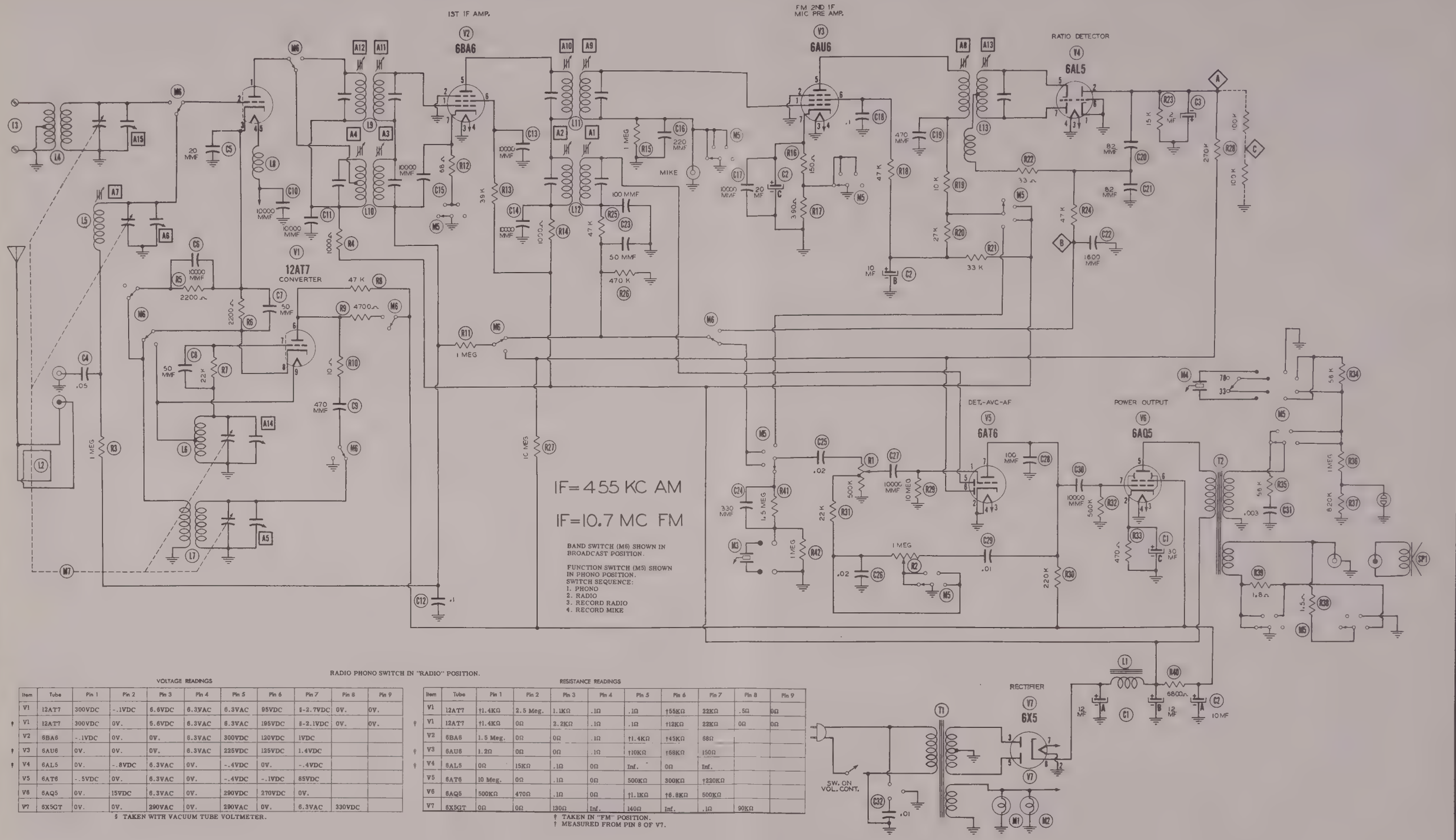


FIG. 2



RADIO PHONO SWITCH IN "RADIO" POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AT7	300VDC	-.1VDC	6.6VDC	6.3VAC	6.3VAC	95VDC	§-2.7VDC	0V.	0V.
† V1	12AT7	300VDC	0V.	6.6VDC	6.3VAC	6.3VAC	195VDC	§-2.1VDC	0V.	0V.
V2	6BA6	-.1VDC	0V.	0V.	6.3VAC	300VDC	120VDC	1VDC		
† V3	6AU6	0V.	0V.	0V.	6.3VAC	225VDC	125VDC	1.4VDC		
† V4	6AL5	0V.	-.8VDC	6.3VAC	0V.	-.4VDC	0V.	-.4VDC		
V5	6AT6	-.5VDC	0V.	6.3VAC	0V.	-.4VDC	-.1VDC	85VDC		
V6	6AQ5	0V.	15VDC	6.3VAC	0V.	290VDC	270VDC	0V.		
V7	6X5GT	0V.	0V.	290VAC	0V.	290VAC	0V.	6.3VAC	330VDC	

§ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AT7	†1.4KΩ	2.5 Meg.	1.1KΩ	.1Ω	.1Ω	†55KΩ	22KΩ	.5Ω	0Ω
† V1	12AT7	†1.4KΩ	0Ω	2.2KΩ	.1Ω	.1Ω	†12KΩ	22KΩ	0Ω	0Ω
V2	6BA6	1.5 Meg.	0Ω	0Ω	.1Ω	†1.4KΩ	†45KΩ	68Ω		
† V3	6AU6	1.2Ω	0Ω	0Ω	.1Ω	†10KΩ	†68KΩ	150Ω		
† V4	6AL5	0Ω	15KΩ	.1Ω	0Ω	Inf.	0Ω	Inf.		
V5	6AT6	10 Meg.	0Ω	.1Ω	0Ω	500KΩ	300KΩ	†220KΩ		
V6	6AQ5	500KΩ	470Ω	.1Ω	0Ω	†1.1KΩ	†6.8KΩ	500KΩ		
V7	6X5GT	0Ω	0Ω	130Ω	Inf.	140Ω	Inf.	.1Ω	90KΩ	

† TAKEN IN "FM" POSITION.
† MEASURED FROM PIN 8 OF V7.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA RECORDIO PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
	RESISTANCE	WATTS			
R3	1 Meg.	½		BTS-1 Meg.	AVC Network
R4	1000Ω	½		BTS-1000	Conv. Plate Decoupling
R5	2200Ω	½		BTS-2200Ω	Conv. Cathode
R6	2200Ω	½		BTS-2200	Conv. Cathode
R7	22KΩ	½		BTS-22KΩ	Osc. Grid
R8	47KΩ	1		BTS-47K	Osc. Plate
R9	4700Ω	1		BTA-4700	Osc. Plate
R10	10Ω	½			Parasitic Supp.
R11	1 Meg.	½		BTS-1 Meg.	AVC Network
R12	68Ω	½			1st IF Cathode
R13	39KΩ	½		BTA-39K	1st IF Screen
R14	1000Ω	½		BTS-1000	1st IF-Plate Decoupling
R15	1 Meg.	½		BTS-1 Meg.	Mic. Pre Amp. Grid
R16	150Ω	½			2nd FM IF Grid
R17	390Ω	½		BW-½-390	Mic. Pre Amp. Cathode
R18	47KΩ	½		BTS-47K	2nd FM IF Screen
R19	10KΩ	½		BTS-10K	2nd FM IF Plate Decoupling
R20	27KΩ	½		BTS-27K	Mic. Pre Amp. Plate Decoupling
R21	33KΩ	½		BTS-33K	Decoupling
R22	33Ω	½			Balancing
R23	15KΩ	½		BTS-15K	Ratio Det. Diode Load
R24	47KΩ	½		BTS-47K	De-emphasis
R25	47KΩ	½		BTS-47K	Diode Filter-See Note 1
R26	470KΩ	½		BTS-470K	Diode Load
R27	10 Meg.	½		BTS-10 Meg.	Delayed AVC
R28	270KΩ	½		BTS-270K	AVC Network
R29	10 Meg.	½		BTS-10 Meg.	AF Grid - See Note 2
R30	220KΩ	½		BTS-220K	AF Plate -See Note 3
R31	22KΩ	½		BTS-22K	Tone Compensation
R32	500KΩ	½		BTS-470K	Output Grid-See Note 4
R33	470Ω	1		BTA-470	Output Cathode
R34	56KΩ	½		BTS-56K	Tone Compensation
R35	56KΩ	½		BTS-56K	Tone Compensation
R36	1 Meg.	½		BTS-1 Meg.	Series Neon Lamp
R37	820KΩ	½		BTS-820K	Neon Lamp Shunt
R38	1.5Ω	½		BW-½-1.5	Voice Coil Shunt-Wire Wound
R39	1.8Ω	½		BW-½-1.8	Voice Coil Shunt-Wire Wound
R40	6800Ω	1		BTA-6800	Filter
R41	1.5 Meg.	½		BTS-1.5 Meg.	Tone Compensation
R42	1 Meg.	½		BTS-1 Meg.	Tone Compensation

Note 1. Items C23A, C23B and R25 are combined into one unit.
Note 2. Items C25 and R29 are combined into one unit.
Note 3. Items C28 and R30 are combined into one unit.
Note 4. Items C30 and R32 are combined into one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA RECORDIO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T2	5.7KΩ	3.3Ω	730Ω	1.6Ω SEC. 2 3.5KΩ	81-2093				

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA RECORDIO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .46A	600VCT @ .057ADC	6.3VAC @ 2.9A		80-2168-2	P-6120 ①	P-2957 ①	PH-70

① Add series resistor to reduce plate voltage.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA RECORDIO PART No.	VIKING PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.				
SP1	PM	3.2Ω		5729	57A1	
	CONE DIA.	V. C. DIA.				
SP2	4 3/4" x 7"	0/16"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (@ CURRENT 1000 m^)	REPLACEMENT DATA RECORDIO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.057A	380Ω	10 Henries	14-2097	C-1723	C-2975	R-1240 ②	② Drill new mounting hole.

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RECORDIO PART No.	REPLACEMENT DATA MEISSNER PART No.	
L2	AM Ant.	0Ω				In cabinet lid.
L3	FM Ant.	0Ω				36Ω line in cabinet.
L4	FM Ant.	0Ω				
L5	AM Ant.	1.5Ω				
L6	FM Osc.	0Ω				
L7	AM Osc.	.5Ω	.3Ω		14-1060	
L8	Fil. Choke	.2Ω				
L9	1st FM IF	1.2Ω	1.2Ω			
L10	1st AM IF	13Ω	13Ω			
L11	2nd FM IF	1.2Ω	1.2Ω			
L12	2nd AM IF	13Ω	13Ω		16-6678	
L13	Ratio Det. Trans.	2.5Ω	.5Ω			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA RECORDIO PART No.		NOTES
M1	Bayonet	6-8	.15	Brown			Type #47
M2	Bayonet	6-8	.15	Brown			Type #47

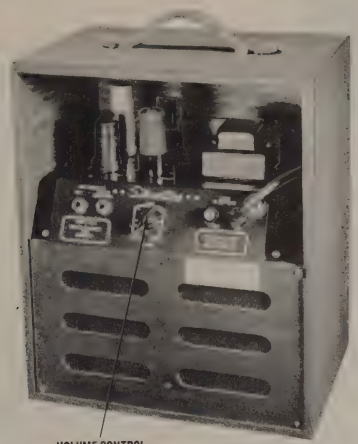
PHONO CARTRIDGE and NEEDLE

ITEM No.	RECORDIO PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	REMARKS
M3		LT-2M	TM	W61B	A62A	Play
M4		X-26				Record

MISCELLANEOUS

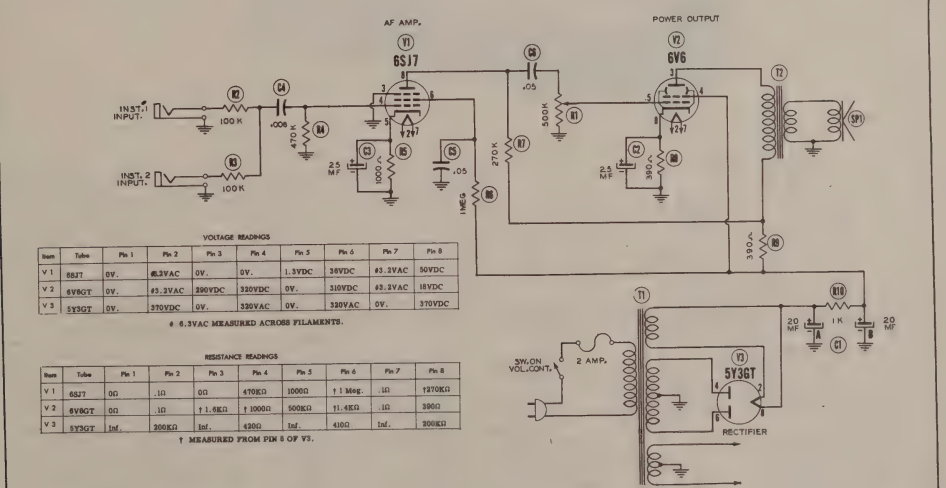
ITEM No.	PART NAME	RECORDIO PART No.	NOTES
M5	Switch		Function
M6	Switch		Band
M7	2 Gang Var. Cap.		(17-509MMF, 11-207MMF)

SILVERTONE MODEL
1301 (Ch. 319. 190)



SILVERTONE MODEL 1301

TRADE NAME	Silvertone, Model 1301 (Ch. 319.190)
SUPPLIER	Sears, Roebuck and Co., 925 S. Homan St., Chicago, Illinois
TYPE SET	AC Operated Musical Instrument Amplifier
TUBES (THREE)	Types 6SJ7 AF Amp., 6V6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC
RATING	.40 Amp. at 117 Volts AC



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SJ7	0V.	63.2VAC	0V.	0V.	1.3VDC	38VDC	63.2VAC	50VDC
V 2	6V6GT	0V.	63.2VAC	290VDC	320VDC	0V.	310VDC	63.2VAC	18VDC
V 3	5Y3GT	0V.	370VDC	0V.	320VAC	0V.	320VAC	0V.	370VDC

‡ 6.3VAC MEASURED ACROSS FILAMENTS.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SJ7	0Ω	.1Ω	0Ω	470KΩ	1000Ω	† 1 Meg.	.1Ω	†270KΩ
V 2	6V6GT	0Ω	.1Ω	† 1.5KΩ	† 1000Ω	500KΩ	†1.5KΩ	.1Ω	390Ω
V 3	5Y3GT	Inf.	300KΩ	Inf.	420Ω	Inf.	410Ω	Inf.	300KΩ

† MEASURED FROM PIN 8 OF V3.

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91-11

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at minimum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	AF Amp.	6SJ7	6SJ7	8N	
V2	Power Output	6 V6GT	6V6GT	7AC	
V3	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	450		AF44J		EL-220	▲ Filter
B	20	450					■ Filter
C2	25	25		PRS25/25		TA-25	Output Cathode Bypass-See Note
C3	25	25		PRS25/25		TA-25	AF Amp. Cathode Bypass-See Note
C4	.006	600		P688-006	GP2M-0056	TM-26	Audio Coupling
C5	.05	600		P688-05		TM-15	AF Amp. Screen Bypass
C6	.05	600		P688-05		TM-15	Audio Coupling

Note . Some models use 10MFD in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Silvertone PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	H20066P38	Q13-133	M-60-Z	Volume control
B	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R2	100KΩ	1	H-20004P86	BTA-100K	Tone Compensation
R3	100KΩ	1	H-20004P86	BTA-100K	Tone Compensation
R4	470KΩ	½	H-2004P9A	BTS-470K	AF Amp. Grid
R5	1000Ω	1	H-20004P62	BTA-1000	AF Amp. Cathode
R6	1 Meg.	1	H-20004P98	BTA-1 Meg.	AF Amp. Screen
R7	270KΩ	½	H-20004P91	BTS-270K	AF Amp. Plate
R8	390Ω	1	H-20005P57	BTA-390	Output Cathode
R9	390Ω	1	H-20005P57	BTA-390	Output Plate
R10	1000Ω	10	H-20013P36	AB-1000	Filter-Wire Wound

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T1	117VAC @ .40A	620VCT .042ADC	5VAC @ 2A	6.3VAC @ 1.7A	H-20071	P-6010	P-2950	PH-70B②

② Add series resistor to reduce plate voltage.

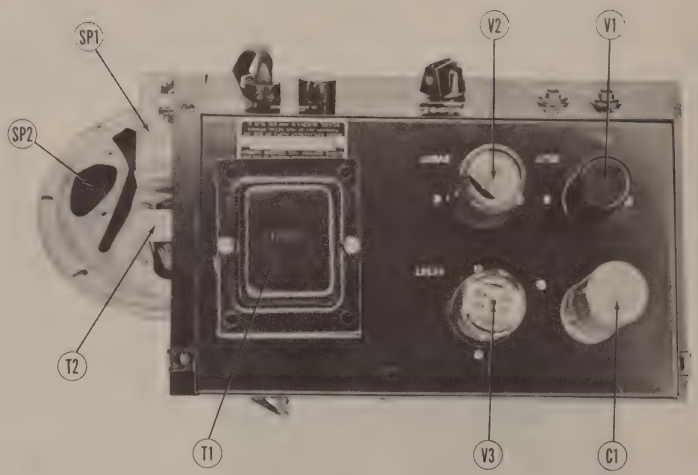
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T2	4.6KΩ	3.5Ω	370Ω	.4Ω	Part of H-6M-23	A-3877	A-2930	RO-302	

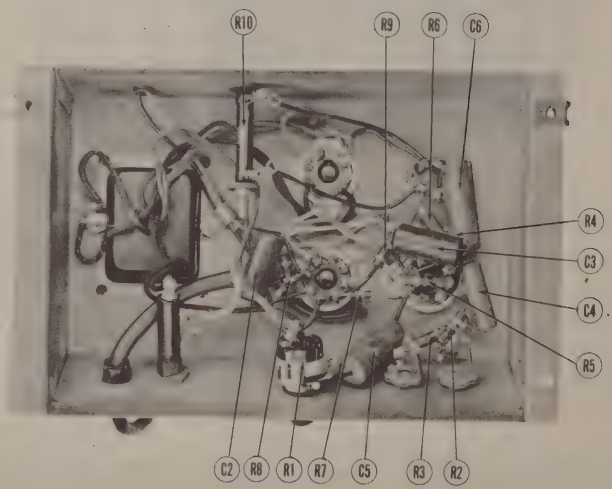
SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD V. C. IMP.		ST-108①		
SP1	PM 3.5Ω	H-6M-23	MOD. P6-X	6A1 ①	① Remount output transformer.
	CONE DIA. V. C. DIA.				
SP2	6" 3/4"				

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



SPARTON MODELS 150, 151, 152, 155
(Ch. 4E10) (BATTERY-LINE OPERATED)

SPARTON MODEL 152

TRADE NAME	Sparton, Models 150, 151, 152, 155 (Ch. 4E10)
MANUFACTURER	Sparks-Withington Co., Jackson, Michigan
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types 1R5 Converter, 1U4 IF Amp., 1U5 DET-AVC-AF, 3V4 Power Output
POWER SUPPLY	110-120 Volts AC-DC or 7.5 Volts "A" Supply and 90 Volts "B" Supply
RATING	.15 Amp. at 117 Volts AC or 50MA at 7.5 Volts DC and 14MA at 90 Volts DC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial turn tuning gang fully closed and set the stop line on the dial scale even with the indentation mark on the frame assembly.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 6 (Grid) of 1R5 (V1). Low side to B-.	456KC (400~ Mod.)	Tuning gang fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1500KC	Set 1500KC calibration even with the indentation on the frame assembly	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA SPARTON PART No.	REPLACEMENT DATA STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	DET. -AVC-AF	1U5	1U5	6BW	
V4	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SPARTON PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	150	PA4300-11	AF844D		EL-224	■ Filter
B	20	150					▲ Filter
C	20	150					Filter
C2	100	15	PA4308-3	PRS15/100		UHC-115	Filament Bypass
C3	1000		*	GP1000M	GP2L-001	1FM-21	IF Grid Filter
C4	10000		PA4334-2	BPD-10	821-01	36C1	AVC Filter
C5A	100		†	GP100M	GP1K-100	1FM-31	Diode RF Filter
B	100			GP100M	GP1K-100	1FM-31	Diode RF Filter
C6	1000		HG35G-102	GP1000M	GP2L-001	1FM-21	Audio Coupling
C7A	100		‡	GP100M	GP1K-100	1FM-31	AF Amp. Plate Bypass
B	5000			GP5000M	811-005	1FM-25	AF Amp. Screen Bypass
C	2000			GP2000M	GP2M-002	1FM-22	Audio Coupling
C8	.001	600	PC40GM-102	P688-001	GP2L-001	TM-21	Output Plate Bypass
C9	10000		PA4334-2	BPD-10	821-01	36C1	RF Bypass
C10	.25	200	PA4324-1	P488-25		TC-2	Filament Bypass
C11	.1	200	PC40GK-104	P288-1		72P52	Line Isolation
C12	.05	400	PC40HL-503	P488-05		TM-15	Line Filter

* Items C3A and R3 are combined into one unit obtainable under MFGR'S Part No. PA4330-15.
† Items C5A, C5B and R4 are combined into one unit obtainable under MFGR'S Part No. PA4329-1.
‡ Item C7A, C7B C7C, R7A, R7B and R7C are combined into one unit, obtainable under MFGR'S Part No. PA4333-1.

CONTROLS

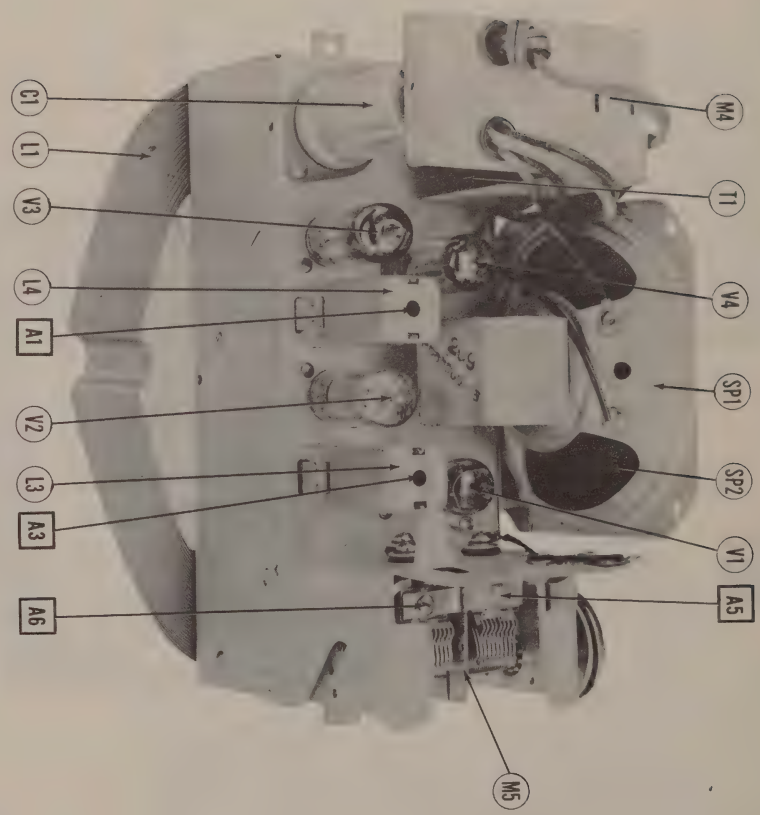
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SPARTON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	1 Meg.	½	PA4423			Volume control and switch

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SPARTON PART No.	IRC PART No.	IDENTIFICATION CODES
R2	100KΩ	½	BR12S-104	BTS-100K	Osc. Grid
R3	10 Meg.	½	*	BTS-10 Meg.	IF Grid
R4	47KΩ	½	†	BTS-47K	Diode Filter
R5	3.3 Meg.	½	BR12S-335	BTS-3.3 Meg.	AVC Network
R6	10 Meg.	½	BR12S-106	BTS-10 Meg.	AF Amp. Grid
R7A	4.7 Meg.	½	‡	BTS-4.7 Meg.	AF Amp. Screen
B	1 Meg.	½	‡	BTS-1 Meg.	AF Amp. Plate
C	2.2 Meg.	½	‡	BTS-2.2 Meg.	Output Grid
R8	120Ω 5%	½	BR12G-121	BW-½-120-5%	Filament String
R9	180Ω 5%	½	BR12G-181	BW-½-180-5%	Filament String
R10	390Ω 5%	½	BR12G-391	BW-½-390-5%	Filament String
R11	2200Ω 5%	½	BR12G-222	BTS-2200-5%	Filament String
R12A	1200Ω	5	PA4209	AB-1200	Filter-Wire Wound
B	1200Ω	5		AB-1200	Filament Dropping-Wire Wound
R13	2700Ω	½	BR12S-272	BTS-2700	Filter
R14	47Ω	2	DR11S-470		Surge Limiter

* Items C3 and R3 are combined into one unit, obtainable under MFGR'S Part No. PA4330-15
† Items C5A, C5B and R4 are combined into one unit, obtainable under MFGR'S Part No. PA4329-1
‡ Items C7A, C7B C7C, R7A, R7B and R7C are combined into one unit, obtainable under MFGR'S Part No. PA4333-1

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SPARTON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	7.5KΩ	3.1Ω	300Ω	.8Ω		A-3879	A-2932	RO-13	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SPARTON PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-113		
SP1	PM	3.1Ω	PC63000-23	MOD. P4-X	4A07	
	CONE DIA.	V. C. DIA.				
SP2	3 7/8"	9/16 "				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SPARTON PART No.	MEISSNER PART No.	
L1	Loop Ant.	1.5Ω		PB42202		
L2	Osc. Coil	1.5Ω	5Ω	AA6797-4	14-1074	
L3	1st IF	28Ω	28Ω	PB42201-1	16-6678	
L4	2nd IF	27Ω	27Ω	PB42201-2	16-6678	

SELENIUM RECTIFIER

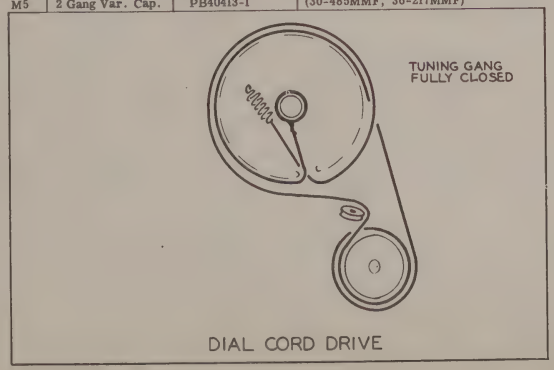
ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	SPARTON PART No.	SYLVANIA PART No.		
M1	.065ADC	PA4208	NB-5		

BATTERIES

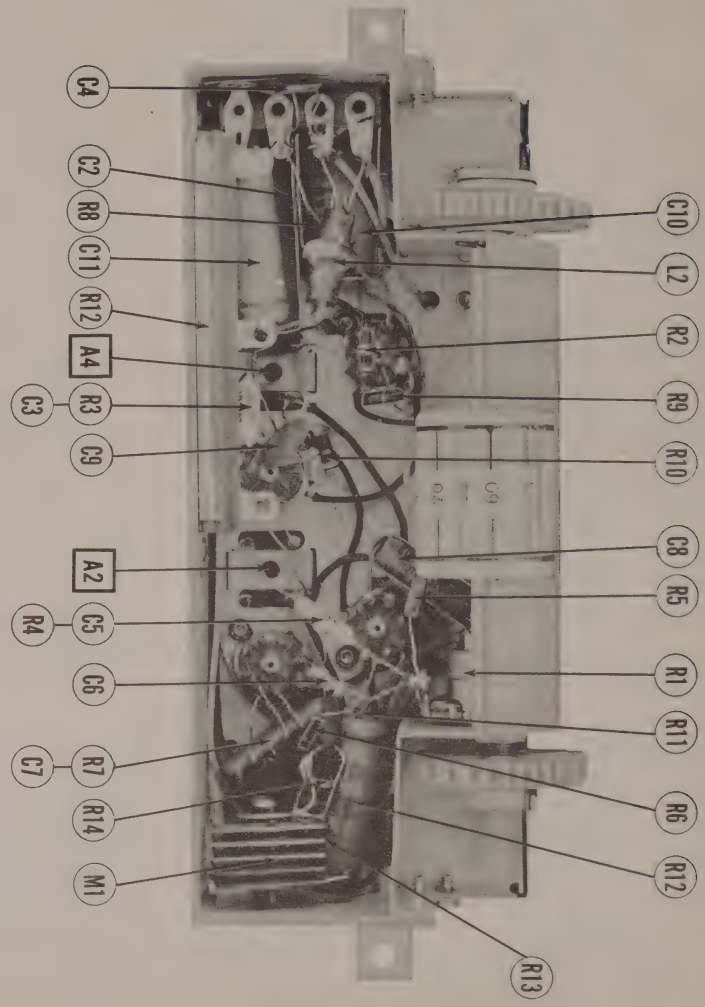
ITEM No.	VOLTAGE	SPARTON PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2 M3	7.5V "A" 90V "B"		717	455		C5	XX30A		2 used in series

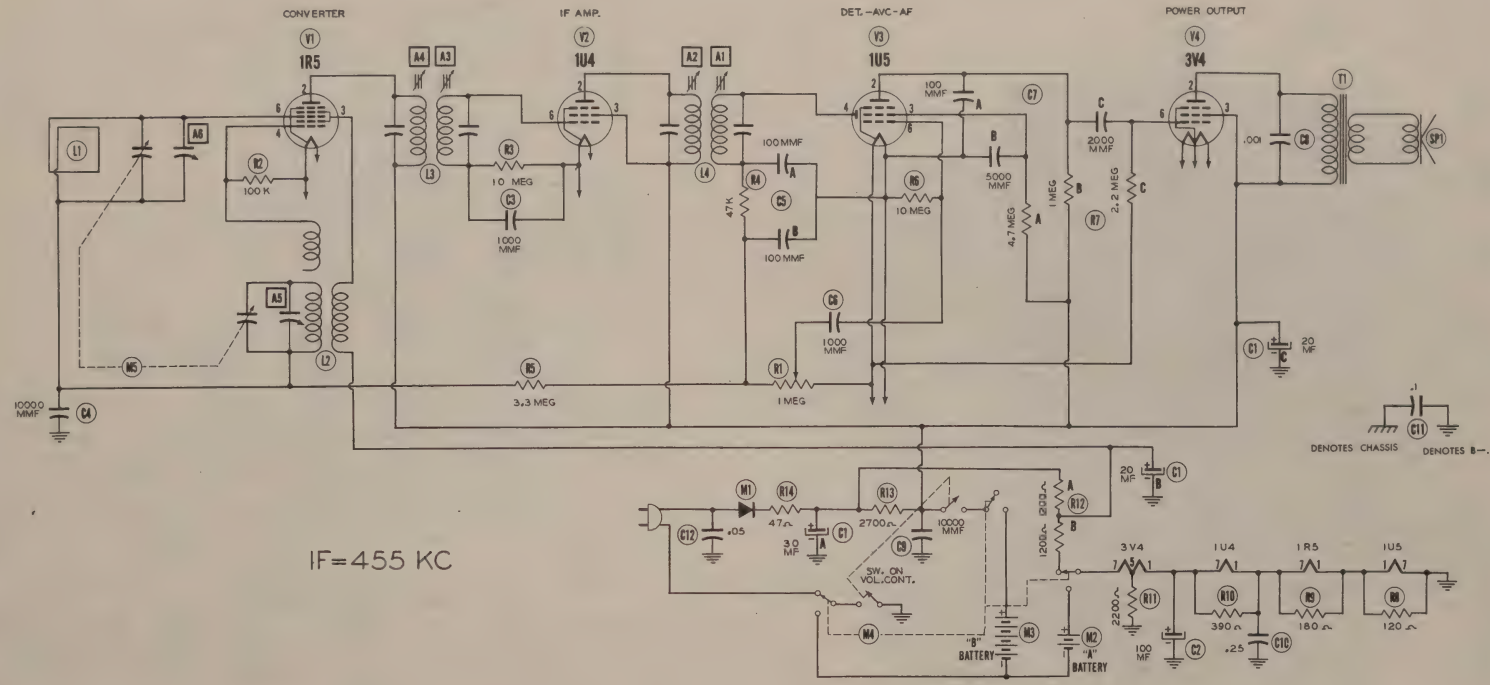
MISCELLANEOUS

ITEM No.	PART NAME	SPARTON PART No.	NOTES
M4	Switch	PB42012	AC/DC-Battery
M5	2 Gang Var. Cap.	PB40413-1	(30-485MMF, 36-217MMF)



CHASSIS—BOTTOM VIEW





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VOLTAGE AND RESISTANCE MEASUREMENTS TAKEN IN AC-DC POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	1.2VDC	90VDC	65VDC	8-12VDC	1.2VDC	0V.	2.4VDC
2	1U4	2.9VDC	90VDC	90VDC	0V.	2.8VDC	0V.	4.4VDC
3	1U5	1.4VDC	7.5VDC	15VDC	.2VDC	0V.	-.1VDC	0V.
4	3V4	4.4VDC	90VDC	90VDC	0V.	5.9VDC	.1VDC	7.4VDC

ǂ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V. 1	1R5	*	†2.7KΩ	†2.7KΩ	ǂ100KΩ	ǂ5KΩ	ǂ4 Meg.	*
V. 2	1U4	*	†2.7KΩ	†2.7KΩ	ǂ5KΩ	*	ǂ10Meg.	*
V. 3	1U5	*	†1 Meg.	†4.7 Meg.	† 1 Meg.	Inf.	ǂ10 Meg.	*
V. 4	3V4	*	†2.7KΩ	†2.7KΩ	Inf.	*	†2.2Meg.	*

* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM OUTPUT OF M1.
ǂ MEASURED FROM PIN 7 OF V3.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

TELE-TONE MODELS
TV-250, TV-254

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MODEL TV-250

TELE-TONE MODELS
TV-250, TV-254

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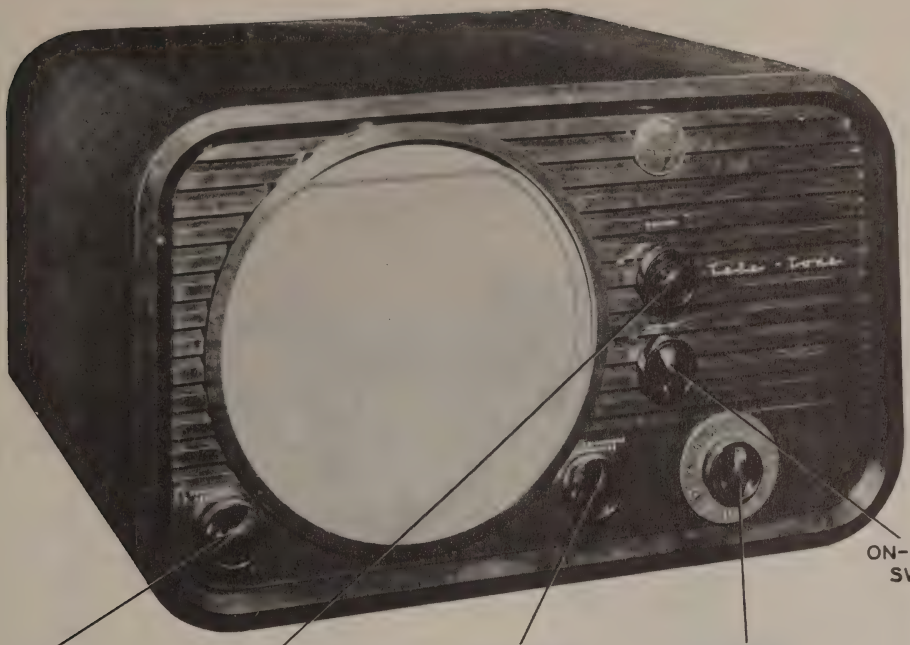

TELE-TONE MODELS
TV-250, TV-254

TELE-TONE MODEL TV-250

TRADE NAME	Tele-Tone Models TV-250, TV-254
MANUFACTURER	Tele-Tone Radio Corp., 540 W. 58th St., New York, New York
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC-60 Cycle
RATING	1.45 Amp. at 117 Volts AC
TUNING RANGE—Channels 2 thru 13	

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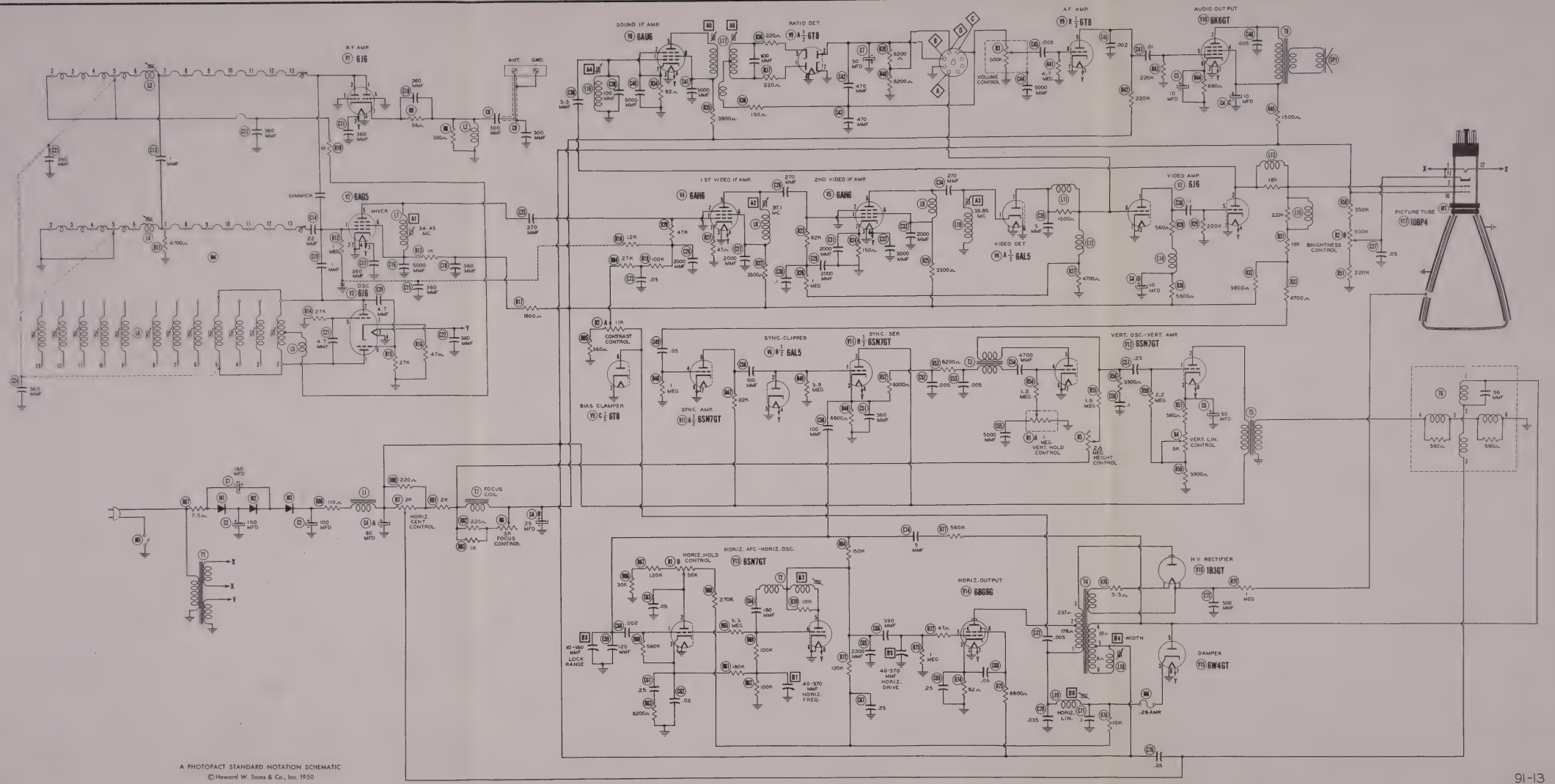

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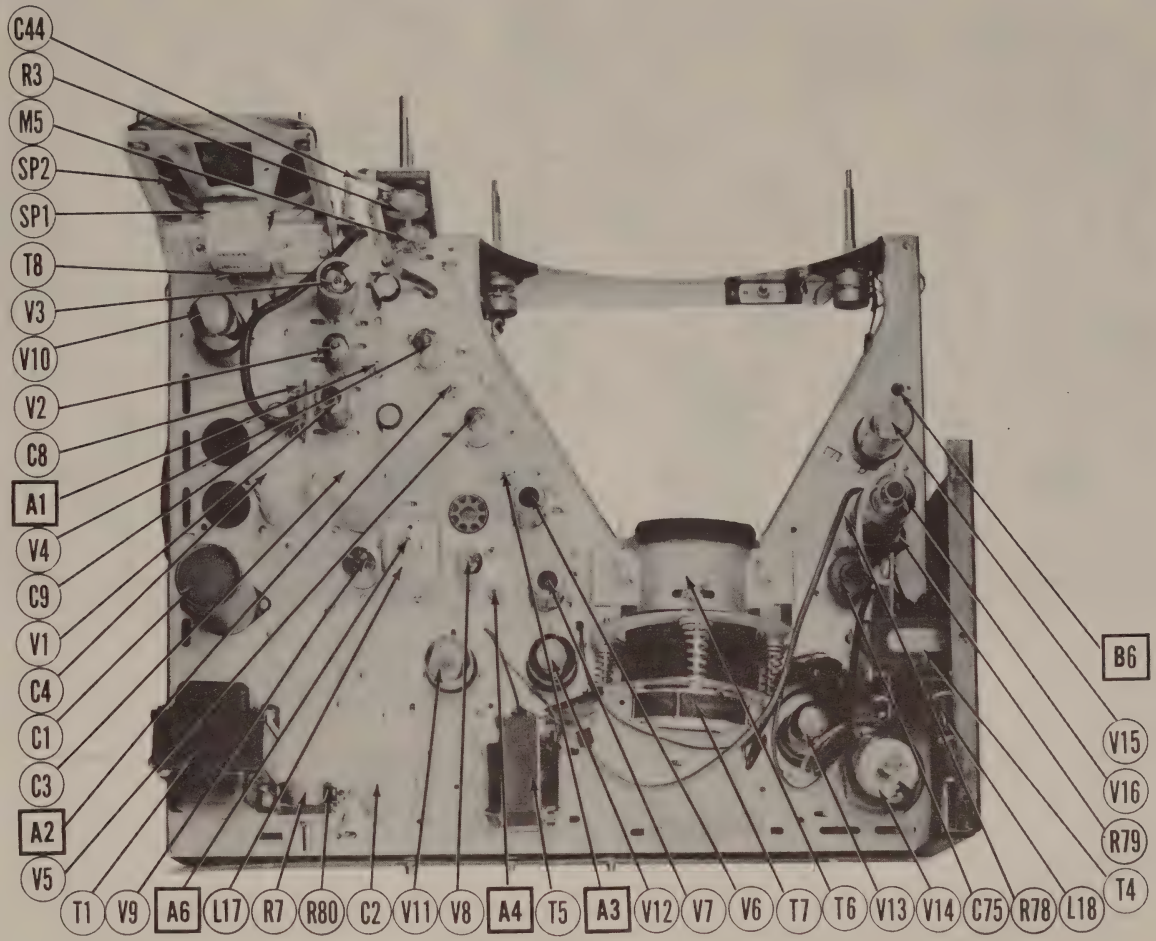
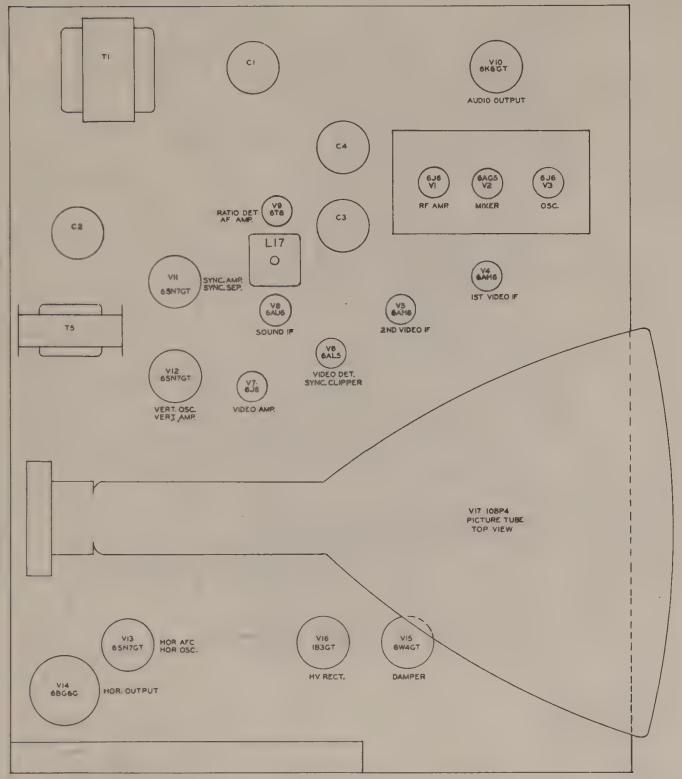
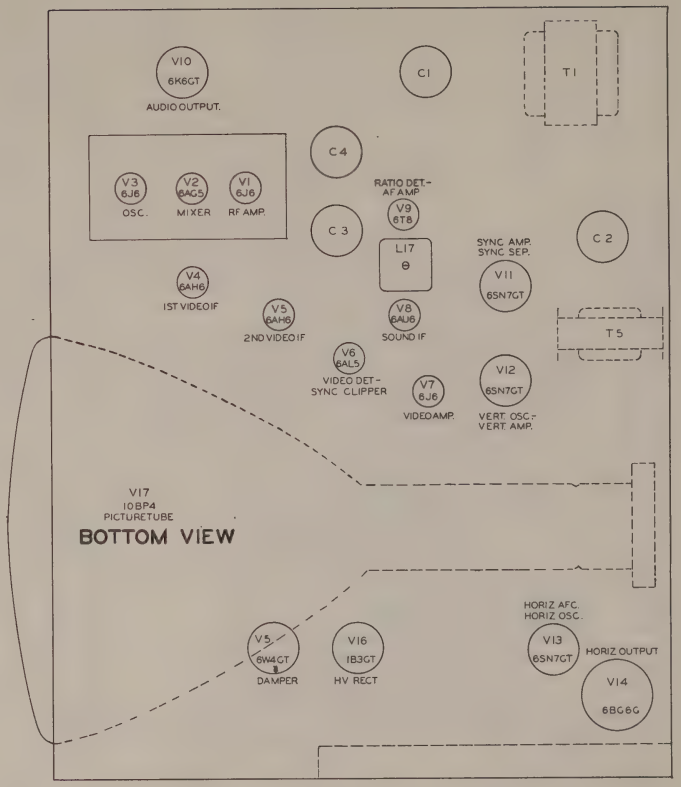
91-13



CHASSIS TOP VIEW

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V13) from its socket.

VIDEO IF ALIGNMENT

Remove the local oscillator tube (V3) to prevent erroneous indications.
Turn the contrast control to slightly less than maximum clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	34.45MC (Unmod.)	Any	DC Probe to Point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	Direct	"	37.1MC	"	"	A2	"
3.	Direct	"	35.85MC	"	"	A3	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	34MC (10MC Sweep)	32.8MC 34.45MC 37.0MC 37.3MC	Any	Vert. Amp. to Point (A). Low side to chassis.		Check for response curve similar to Fig 1 with markers as shown. If necessary retouch A1, A2, A3, for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 5 (Grid) of 6J6 (V7). Low side to chassis.	4.5MC	Any channel not used locally	DC Probe to Point (B). Common to chassis.	A4, A5	Adjust for maximum deflection.
6.	.01MFD	"	"	"	DC Probe to Point (C). Common to Point (D).	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 5 (Grid) of 6J6 (V7). Low side to chassis.	4.5MC (450KC Sweep)	4.5MC	Any channel not used locally	Vert. Amp. to Point (B). Low side to chassis.	A4, A5	Disconnect stabilizer capacitor C7. Adjust for maximum amplitude and symmetry as per Fig 2.
6.	.01MFD	"	"	"	"	Vert. Amp. to Point (C). Low side to chassis.	A6	Reconnect stabilizer cap. C7. Adjust A6 so 4.5MC occurs at center of crossover lines as per Fig 3. SLIGHTLY retouch A5 for max. amplitude & straightness of crossover lines.

OSCILLATOR ALIGNMENT

The RF and mixer section of this receiver are normally very stable and should not require alignment in the field.
Replace the local oscillator tube (V3).
Turn the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to ungrounded antenna terminal. Low side to grounded terminal.	57MC (10MC Sweep)	55.25MC 59.75MC	2	Vert. Amp. to Point (A). Low side to chassis.	A7	Adjust to place the sound marker as shown in Fig 4. The video marker should be between 45% and 60%. If the video marker fails to fall between 45% and 60% on all channels, turn the channel switch to channel 6 and make slight readjustment of the video IF adjustments.
			63MC (10MC SWP)	61.25MC 65.75MC	3		A8	
			69MC (10MC SWP)	67.25MC 71.75MC	4		A9	
			79MC (10MC SWP)	77.25MC 81.75MC	5		A10	
			85MC (10MC SWP)	83.25MC 87.75MC	6		A11	
			177MC (10MC SWP)	175.25MC 179.75MC	7		A12	
			183MC (10MC SWP)	181.25MC 185.75MC	8		A13	
			189MC (10MC SWP)	187.25MC 191.75MC	9		A14	
			195MC (10MC SWP)	193.25MC 197.75MC	10		A15	
			201MC (10MC SWP)	199.25MC 203.75MC	11		A16	
			207MC (10MC SWP)	205.25MC 209.75MC	12		A17	
			213MC (10MC SWP)	211.25MC 215.75MC	13		A18	

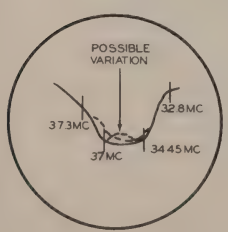


FIG. 1

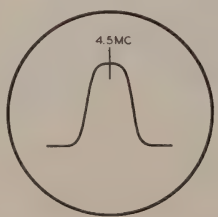


FIG. 2

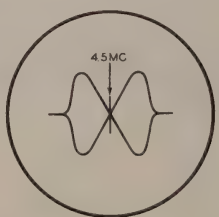


FIG. 3

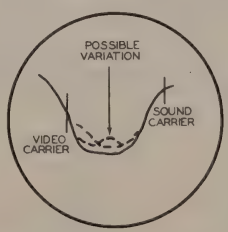
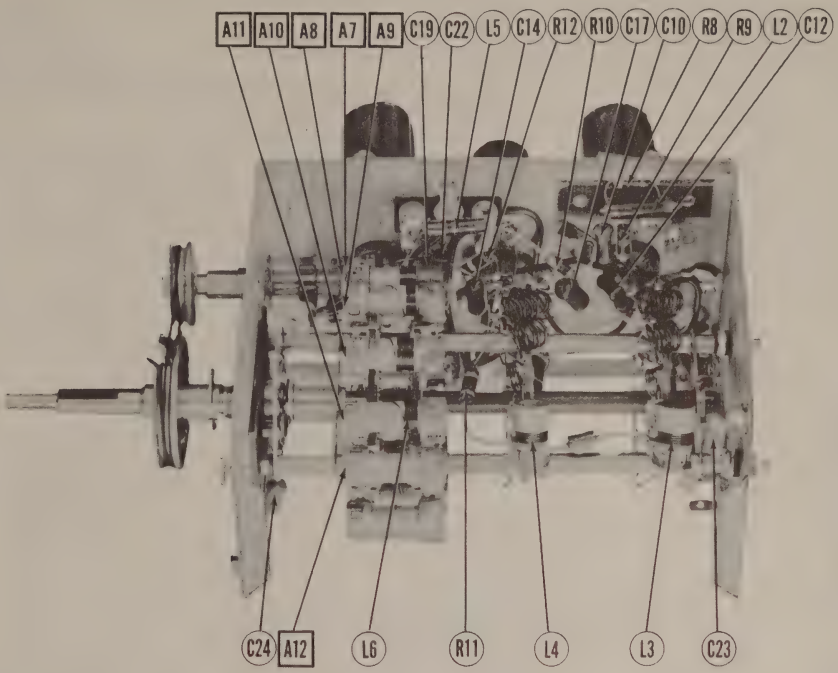
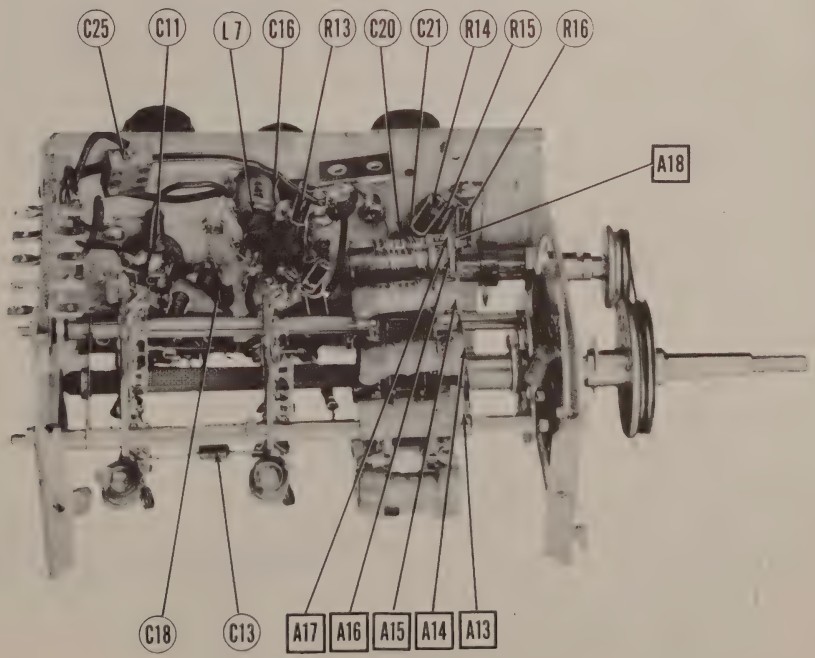


FIG. 4



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	95VDC	95VDC	6.3VAC	0V.	0V.	0V.	.9VDC		
V 2	6AG5	-2VDC	0V.	6.3VAC	0V.	110VDC	110VDC	0V.		
V 3	6J6	95VDC	95VDC	6.3VAC	0V.	§-4.2VDC	§-3.8VDC	.4VDC		
V 4	6AH6	-.4VDC	0V.	0V.	6.3VAC	135VDC	135VDC	.4VDC		
V 5	6AH6	0V.	0V.	0V.	6.3VAC	135VDC	135VDC	1.3VDC		
V 6	6AL5	0V.	-.7VDC	0V.	6.3VAC	0V.	0V.	-.1VDC		
V 7	6J6	100VDC	65VDC	0V.	6.3VAC	-.5VDC	-.1VDC	0V.		
V 8	6AU6	0V.	.9VDC	0V.	6.3VAC	115VDC	115VDC	.9VDC		
V 9	6T8	-.2VDC	-.4VDC	-.2VDC	0V.	6.3VAC	-14VDC	0V.	-.4VDC	60VDC
V 10	6K6GT	0V.	0V.	270VDC	280VDC	0V.	60VDC	6.3VAC	19VDC	
V 11	6SN7GT	-.7VDC	330VDC	12VDC	-.4VDC	100VDC	0V.	0V.	6.3VAC	
V 12	6SN7GT	.6VDC	330VDC	28VDC 62VDC	-2.4VDC	50VDC 100VDC	0V.	0V.	6.3VAC	
V 13	6SN7GT	-1.7VDC	100VDC	-4.8VDC	-42VDC	135VDC	0V.	0V.	6.3VAC	
V 14	6BG6G	0V.	0V.	7.5VDC	0V.	0V.	0V.	6.3VAC	250VDC	TOP CAP *
V 15	6W4GT	0V.	0V.	400VDC	0V.	330VDC	0V.	6.3VAC	0V.	
V 16	1B3GT	* DO NOT MEASURE.								
V 17	10BP4	♦207VDC	65VDC	PIN 10 330VDC	PIN 11 207VDC	PIN 12 ♦207VDC				

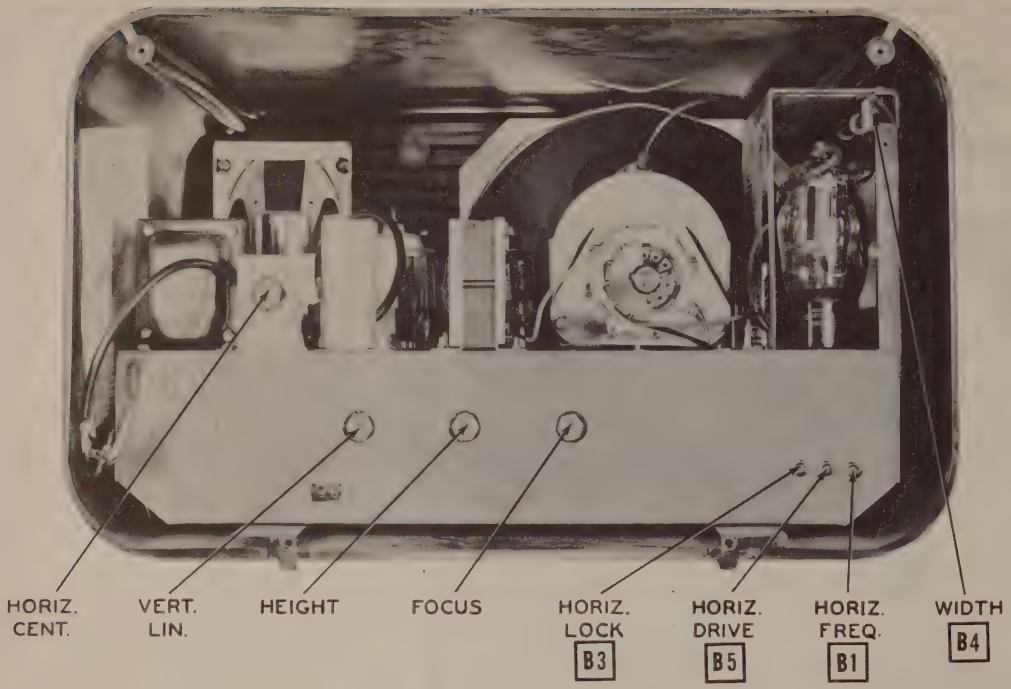
§ TAKEN WITH VACUUM TUBE VOLTMETER.
* DO NOT MEASURE.
♦ 6.3VAC MEASURED ACROSS FILAMENTS.
NOTE: CONTRAST CONTROL SET AT MAXIMUM FOR THESE MEASUREMENTS.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†5.3KΩ	†5.3KΩ	.1Ω	0Ω	0Ω	0Ω	56Ω	.	
V 2	6AG5	1 Meg.	0Ω	.1Ω	0Ω	†5.3KΩ	†5.3KΩ	0Ω		
V 3	6J6	†4.3KΩ	†4.3KΩ	.1Ω	0Ω	27KΩ	27KΩ	47Ω		
V 4	6AH6	160KΩ	0Ω	0Ω	.1Ω	†5.8KΩ	†5.8KΩ	47Ω		
V 5	6AH6	1 Meg.	0Ω	0Ω	.1Ω	†5.8KΩ	†5.8KΩ	150Ω		
V 6	6AL5	0Ω	3.9 Meg.	0Ω	.1Ω	0Ω	0Ω	4.7KΩ		
V 7	6J6	†8.6KΩ	†22KΩ	0Ω	.1Ω	220KΩ	4.7KΩ	0Ω		
V 8	6AU6	.5Ω	82Ω	0Ω	.1Ω	†6.4KΩ	†6.4KΩ	82Ω		
V 9	6T8	500KΩ	12.5KΩ	500KΩ	0Ω	.1Ω	11KΩ	0Ω	4.7 Meg.	†220KΩ
V 10	6K6GT	0Ω	0Ω	†2.2KΩ	†1.7KΩ	220KΩ	†220KΩ	.1Ω	680Ω	
V 11	6SN7GT	3.9 Meg.	†140Ω	6.8KΩ	1 Meg.	†22KΩ	0Ω	0Ω	.1Ω	
V 12	6SN7GT	2.2 Meg.	†650Ω	9.5KΩ 4.5KΩ	2.2 Meg.	†4Meg. †1.8Meg.	0Ω	0Ω	.1Ω	
V 13	6SN7GT	750KΩ	#320KΩ	270KΩ	190KΩ	#130KΩ	0Ω	0Ω	.1Ω	
V 14	6BG6G	Inf.	0Ω	82Ω	Inf.	1 Meg.	Inf.	.1Ω	†7KΩ	TOP CAP #200Ω
V 15	6W4GT	Inf.	Inf.	470KΩ	Inf.	†145Ω	Inf.	.1Ω	0Ω	
V 16	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #460Ω
V 17	10BP4	220KΩ	†22KΩ	PIN 10 †140Ω	PIN 11 220KΩ	PIN 12 220KΩ				

† MEASURED FROM OUTPUT OF M3.
# MEASURED FROM PIN 3 OF V15.
NOTE: CONTRAST CONTROL SET AT MAXIMUM FOR THESE MEASUREMENTS.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CABINET-REAR VIEW

HORIZONTAL OSCILLATOR AND LINEARITY ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

Tune in test pattern and turn horizontal hold control to extreme counter-clockwise position. Picture should remain in synchronization. Turn channel switch to another channel and then back to the original channel. Normally, the picture should be out of synchronization. Turn the control clockwise and the picture should slowly begin to synchronize and finally lock-in. This should occur when the control is approximately 90° from the extreme counter-clockwise position. The picture should remain in synchronization for another 90° in the clockwise direction of the control. At the extreme clockwise position the picture should again drop out of synchronization and $3\frac{1}{2}$ to $4\frac{1}{2}$ bars should be seen sloping downward to the right. If the receiver fails to hold synchronization during this check with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60° in the clockwise direction from the point when it drops into "sync" it will be necessary to align the horizontal oscillator circuit as follows:

(A) HORIZONTAL OSCILLATOR ALIGNMENT:

Turn horizontal hold control to extreme clockwise position. Tune in test pattern and adjust trimmer B1 until picture is out of sync and shows $3\frac{1}{2}$ to $4\frac{1}{2}$ bars sloping downward to the right. If the trimmer has insufficient range, set it to its mid-position (one turn from tight) and adjust slug B2 until bars appear.

(B) HORIZONTAL LOCKING ALIGNMENT:

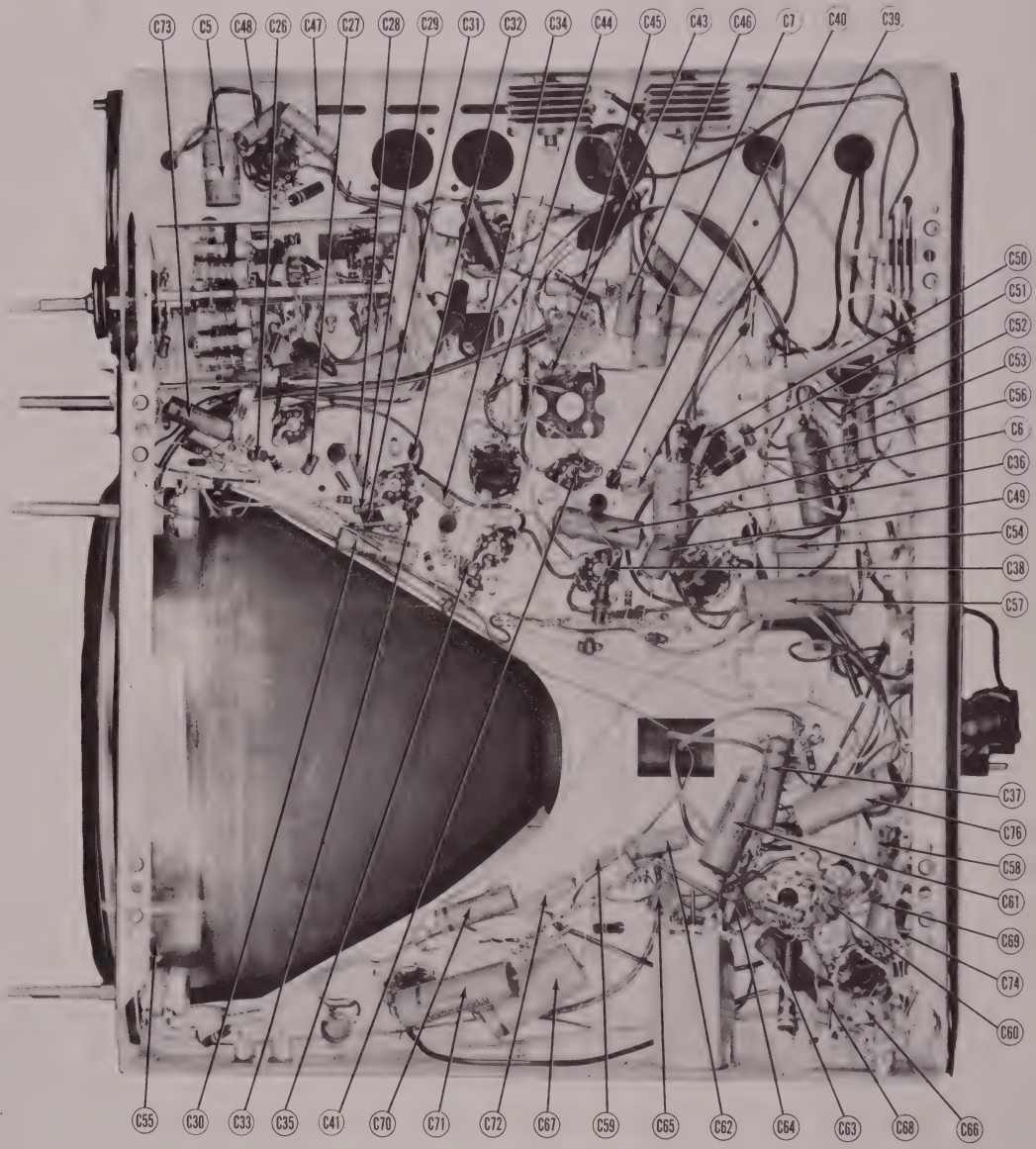
Turn the horizontal hold control to full counter-clockwise position. Switch to another channel and back to the original again.

Slowly turn horizontal hold control clockwise and note the least number of diagonal bars present just before picture syncs. If more than $4\frac{1}{2}$ bars are present just before picture syncs adjust "horizontal lock" trimmer B3 slightly clockwise. If less than $3\frac{1}{2}$ bars are present adjust B3 slightly counter-clockwise and switch channel selector to another channel and back again. Recount bars present at the "lock-in" point. Repeat this procedure until $3\frac{1}{2}$ to $4\frac{1}{2}$ bars are present.

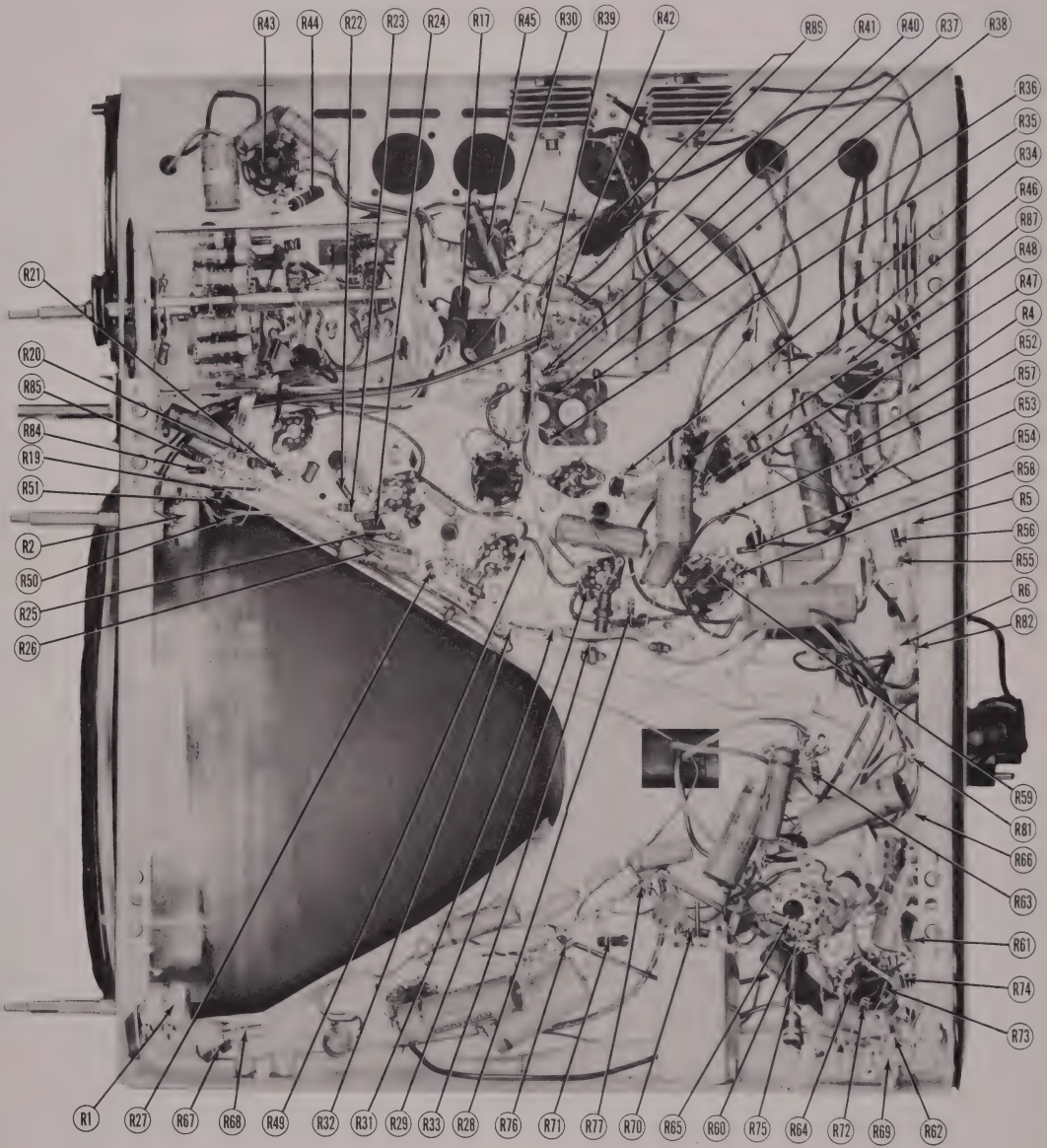
Repeat steps (A) and (B) until conditions exist as outlined under "Horizontal Oscillator Alignment Check".

WIDTH, DRIVE & HORIZONTAL LINEARITY ADJUSTMENTS:

Turn width control B4 to maximum clockwise position. Adjust "horizontal drive" trimmer B5 for maximum brightness and linearity. Adjust horizontal linearity B6 for best linearity in the right half of the picture. Readjust width control until picture fills the mask.

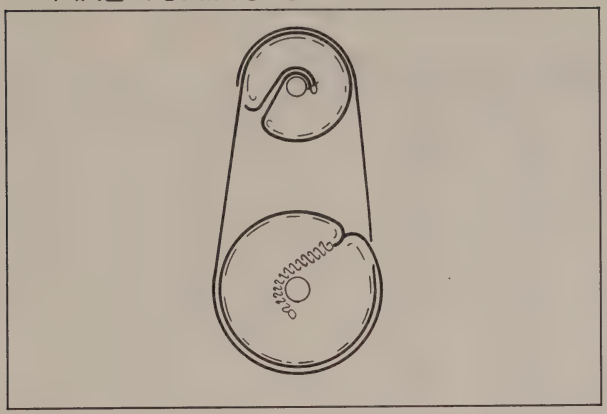


CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



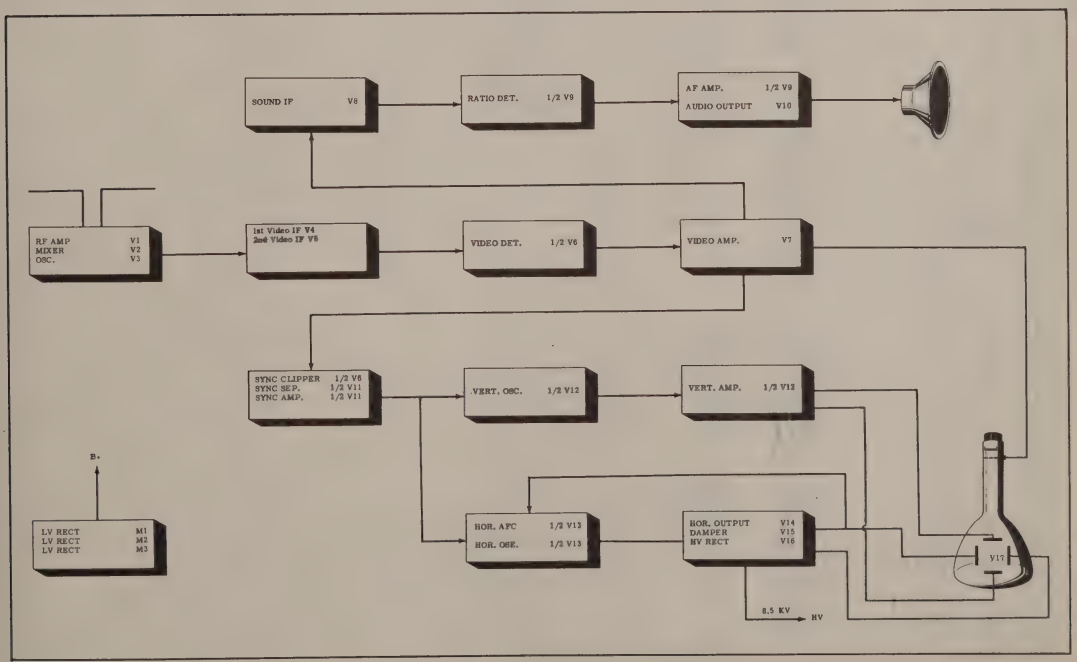
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FINE TUNING CORD STRINGING



DISASSEMBLY INSTRUCTIONS

1. Remove five push-on type control knobs.
2. Loosen two 1/4" hex head bolts holding antenna terminal strip to rear cover. Free terminal strip.
3. Remove four 1/4" hex head bolts holding rear cover. Remove cover.
4. Remove four 3/8" hex head bolts holding chassis. Remove chassis.



BLOCK DIAGRAM

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TELE-TONE PART No.	STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6J6	7BF	
V2	Mixer		6AG5	7BD	
V3	Oscillator		6J6	7BF	
V4	1st Video IF		6AH6	7BK	
V5	2nd Video IF		6AH6	7BK	
V6	Video Det.-Sync. Clipper		6AL5	6BT	
V7	Video Amp.		6J6	7BF	
V8	Sound IF Amp.		6AU6	7BK	
V9	Ratio Det.-AF Amp. -Bias Clamper		6T8	9S	
V10	Audio Output		6K6GT	7S	
V11	Sync Amp -Sync. Sep.		6SN7GT	8BD	
V12	Vert. Osc.-Vert. Amp.		6SN7GT	8BD	
V13	Hor. AFC-Hor. Osc		6SN7GT	8BD	
V14	Hor. Output		6BG6G	5BT	
V15	Damper		6W4GT	4CG	
V16	HV Rectifier		1B3GT	3C	
V17	Picture Tube		10BP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	150	300		APM3G		TVL-101	Filter
C2	150	150		APM3G		TVL-44	Filter
C3	100	450		APM2G1		TVL-9	Filter
C4A	80	400		API65222		TVL-401	▪ Filter
B	25	400					■ Filter
C	10	400					▲ Output Decoupling
D	10	400					Low Pass Filter
C5	10	25		PRS25/10		TVA-5	Output Cathode Bypass
C6	50	50		PRS50/50		TVA-16	Vert. Amp. Cathode Bypass †
C7	50	50		PRS50/50		TVA-16	Stabilizing Cap.
C8	300			GP300M	GP2K-300		Ant. Coupling
C9	300			GP300M	GP2K-300		Ant. Coupling
C10	360			GP360M	GP2K-390		RF Cathode Bypass
C11	360			GP360M	GP2K-390		RF Filament Bypass
C12	360			GP360M	GP2K-390		RF Plate Decoupling
C13	.1						RF Coupling
C14	22			GP22M	GP1K-22		RF Coupling
C15	360			GP360M	GP2K-390		Bias Filter *
C16	5000			BPD-5	811-005	29C1	Mixer Screen Bypass
C17	360			GP360M	GP2K-390		Mixer Fil. Bypass
C18	360			GP360M	GP2K-390		Decoupling
C19	.1						Osc. Coupling
C20	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C21	4.7			CN4.7DNPO	NPOK-4.7		Osc. Feedback
C22	360			GP360M	GP2K-390		Osc. Fil. Bypass
C23	360			GP360M	GP2K-390		Switch Bypass
C24	360			GP360M	GP2K-390		Switch Bypass
C25	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C26	2000			GP2000M	GP2M-002	1FM-22	Bias Filter
C27	2000			GP2000M	GP2M-002	1FM-22	1st V. IF Decoupling
C28	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C29	2000			GP2000M	GP2M-002	1FM-22	AGC Filter
C30	.1	200		P288-1		TM-1	AGC Filter
C31	2000			GP2000M	GP2M-002	1FM-22	2nd V. IF Cath. Bypass
C32	5000			BPD-5	811-005	29C1	2nd V. IF Fil. Bypass
C33	2000			GP2000M	GP2M-002	1FM-22	2nd V. IF Decoupling
C34	270	500		1468-00025	GP2K-270	1FM-325	IF Coupling
C35	5	300		1468-000005	NPOK-5	MS-55	V. Diode Filter
C36	.1	400		P488-1		TM-1	Video Coupling
C37	.05	400		P488-05		TM-15	Pic. Tube Cath. Decoupling
C38	3.3				NPOK-3.3		S. IF Coupling
C39	100	500		1469-0001	NPOM-100	MS-31	Fixed Trimmer
C40	5000			BPD-5	811-005	29C1	S. IF Cathode Bypass
C41	5000			BPD-5	811-005	29C1	S. IF Decoupling
C42	470			GP470M	GP2K-470	1FM-35	Diode Load Cap. †
C43	470			GP470M	GP2K-470	1FM-35	Diode Load Cap. †
C44	5000			BPD-5	811-005	29C1	Vol. Cont. Isolation
C45	.005	600		P688-005	811-005	TM-25	Ratio Det. Coupling §
C46	.002	600		P688-002	GP2M-002	TM-22	De-emphasis
C47	.01	600		P688-01	821-01	TM-11	Audio Coupling
C48	.005	600		P688-005	811-005	TM-25	Output Plate Bypass
C49	.05	600		P688-05		TM-15	Sync. Coupling
C50	.100	500		1468-0001	GP1K-100	1FM-31	Sync. Coupling
C51	360			GP360M	GP2K-390	1FM-34	Sync. Sep. Cath. Bypass
C52	.005	600		P688-005	811-005	TM-25	Integrator Net.
C53	.005	600		P688-005	811-005	TM-25	Integrator Net.
C54	4700	500		1467-005	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C55	5000			BPD-5	811-005	29C1	Vert. Bold Cont. Isolation
C56	.1	600		P688-1		TM-1	Vert. Discharge
C57	.25	600		684-25		TC-2	Vert. Sweep Coupling
C58	100	500		1468-0001	GP1K-100	1FM-31	Hor. Sync. Coupling
C59	120	500		1468-00015	GP2K-120	1FM-315	Voltage Divider
C60	.002	600		P688-003	GP2M-003	TM-22	Hor. Sync. Coupling
C61	.25	400		P488-25		TC-2	AFC Filter
C62	.02	400		P488-02		TM-12	AFC Filter
C63	.05	400		P488-05		TM-15	AFC Plate Bypass
C64	180	500		1468-0002	GP2K-180	1FM-32	Hor. Osc. Grid Cap.
C65	1200	500			GP2M-0022		Hor. Discharge

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C66	390	500		1468-0004	GP2K-390	1FM-34	Hor. Sweep Coupling
C67	.25	600		684-25		TC-2	Decoupling
C68	.05	600		P688-05		TM-15	Hor. Output Screen Bypass
C69	.25	400		P488-25		TC-2	Hor. Output Cath. Bypass
C70	.035	600		P688-033			Damper Filter
C71	.1	1000		1064-1		PX-11	Damper Filter
C72	.005	600		P688-005	811-005	TM-25	Hor. Coupling
C73	.05	200		P288-05		TM-15	Bias Filter
C74	5	1500					Hor. Feedback
C75	500	10000					HV Filter
C76	.25	400		P488-25		TC-2	Hor. Sweep Coupling

* Not used in all models.
† When either item C42 or C43 are replaced, replace both with capacitors of equal value.
§ Some models use 100MFD in this application.
‡ Some models use .01MFD in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.			B11-137 *		Vert. Hold Control, Front
B	50KΩ		TVC-114D	B11-123 *		Horiz. Hold Control, Rear
C	Shaft End		J	E187 *		Attach per instructions in "Concentrikit".
R2A	11.5KΩ		TVC-519D			Contrast Control
B	500KΩ					Brightness Control
R3	500KΩ		TVC-520D	Q13-133	M-60-Z	Volume Control
R4A	5000Ω		TVC-503-1D	Q11-114	AM-19-S	Vert. linearity control
B	Shaft		Not Req.	RQ	KSS-3 †	Attach to R4A per instructions
R5A	2.5 Meg.		TVC-504-1D	Q11-239	AM-84-S	Height control
B	Shaft		Not Req.	RQ	KSS-3 †	Attach to R5A per instructions
R6	3000Ω	4	TVC-521D		10-3000 †	Focus control-Wire Wound
R7	2000Ω	2	TVC-518D	W-2000	43-2000	Horiz. centering control-Wire Wound

* Additional parts to be used with "Concentrikit".
† File slot in shaft to duplicate original.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 20% UNLESS OTHERWISE STATED
R8	330Ω 10%				RF Cathode
R9	560 10%				Parasitic Supp.
R10	1000Ω			BTS-1000	RF Plate Decoupling
R11	4700Ω			BTS-4700	Mixer Coil Shunt
R12	1 Meg.				Mixer Grid
R13	1000Ω			BTS-1000	Mixer Decoupling
R14	27KΩ 10%				Osc. Grid
R15	27KΩ 10%				Osc. Grid
R16	47Ω				Osc. Cathode
R17	1800Ω			BT-2-1800	Voltage Dropping
R18	12KΩ			BTS-12K	Bias Network-See Note 1
R19	100KΩ			BTS-100K	Bias Network-See Note 2
R20	47KΩ				1st Video IF Grid
R21	47Ω 10%				1st Video IF Cathode
R22	3300Ω			BTS-3300	1st Video IF Decoupling
R23	82KΩ 10%				2nd Video IF Grid
R24	150Ω				2nd Video IF Cathode
R25	3300Ω			BTS-3300	2nd Video IF Decoupling
R26	1 Meg.			BTS-1 Meg.	AGC Network
R27	4700Ω 10%			BTS-4700	Video Det. Diode Load
R28	560Ω 10%			BTS-560	Video Amp. Plate
R29	220KΩ			BTS-220K	Video Amp. Grid
R30	5600Ω 10%			BTA-5600	Low Pass Filter
R31	15KΩ 5%			BTS-15K-5%	Video Amp. Plate
R32	3900Ω 10%			BTS-3900	Video Amp. Plate
R33	4700Ω			BTS-3700	Isolation
R34	820 10%				Sound IF Cathode
R35	3900Ω 10%			BTS-3900	Sound IF Decoupling
R36	220Ω				Balancing
R37	220Ω				Balancing
R38	150Ω				Balancing
R39	6200Ω 5%				Ratio Det. Diode Load
R40	6200Ω 5%				Ratio Det. Diode Load
R41	4.7 Meg.			BTS-4.7 Meg.	AF Grid
R42	220KΩ			BTS-220K	AF Plate
R43	220KΩ			BTS-220K	Output Grid
R44	680Ω			BTA-680	Output C athode
R45	1500Ω			BW-2-1500	Filter
R46	1 Meg. 5%			BTS-1 Meg. -5%	Sync. Amp. Grid
R47	22KΩ			BT-2-22K	Sync. Amp. Plate
R48	68000Ω			BTS-6800	Sync. Sep. Cathode
R49	3.9 Meg. 10%			BTS-3.9 Meg.	Sync. Sep. Grid
R50	330KΩ 10%			BTS-330K	Voltage Divider
R51	220KΩ			BTS-220K	Voltage Divider
R52	8200Ω 10%			BTS-8200	Integrator
R53	8200Ω 10%			BTS-8200	Integrator
R54	1.5 Meg. 5%			BTS-1.5 Meg. 5%	Vert. Osc. Grid
R55	1.5 Meg. 10%			BTS-1.5 Meg.	Vert. Osc. Plate
R56	3300Ω			BTS-3300	Vert. Peaking
R57	560Ω			BTS-560	Vert. Amp. Cathode
R58	3900Ω 10%			BTS-3900	Vert. Amp. Cathode
R59	2.2 Meg.			BTS- 2.2 Meg.	Vert. Amp. Grid
R60	560KΩ 10%			BTS-560K	Horiz. AFC Grid
R61	180KΩ 10%			BTS-180K	Horiz. AFC Cathode

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	IRC PART No.	IDENTIFICATION CODES
R62	100KΩ 5%			BTA-100K-5%	Horiz. AFC Cathode
R63	8200Ω 10%			BTS-8200	Horiz. AFC Filter Network
R64	150KΩ 5%			BTS-150K-5%	Horiz. AFC Filter Network
R65	3.3 Meg. 5%			BTA-3.3Meg. 5%	Voltage Divider
R66	30KΩ 10%				Voltage Divider-Temp. Comp.
R67	120KΩ 10%			BTA-120K	Voltage Divider
R68	270KΩ 10%			BTA-270K	Voltage Divider
R69	100KΩ 1%				Horiz. Osc. Grid
R70	10KΩ 5%			BTS-10K-5%	Horiz. Osc. Transformer Shunt
R71	120KΩ 10%			BTA-120K	Horiz. Osc. Plate
R72	47Ω				Parasitic Supp.
R73	1 Meg.			BTS-1 Meg.	Horiz. Output Grid
R74	820 10%			BW-1-82	Horiz. Output Cathode
R75	68000 5%			BT-2-6800	Horiz. Output Screen-Wire Wound
R76	10KΩ 5%			BTS-10K-5%	Filter
R77	560KΩ 10%			BTS-560K	Feedback
R78	3.3Ω				HV Rect. Filament
R79	1 Meg.				HV Filter
R80	220Ω			BW-½-220	Horiz. Centering Control Shunt
R81	20000			AB-2000	Series Focus Coil-Wire Wound
R82	220Ω			BW-½-220	Focus Coil Shunt-See Note 3
R83	1000Ω			BTA-1000	Focus Coil Shunt-See Note 1
R84	27KΩ			BTS-27K	Bias Network-See Note 4
R85	560Ω			BTS-560	Voltage Divider
R86	55Ω				Filter-Wire Wound-See Note 5 and 6
R87	7.5Ω				Surge Limiter-Wire Wound

Note 1. Not used in all models.
Note 2. Some models use 82KΩ resistor in this application.
Note 3. Some models use 1000Ω, 2 watt resistor in this application.
Note 4. Some models use 22KΩ resistor in this application.
Note 5. Some models use two resistors in parallel to obtain required resistance and wattage.
Note 6. Some models use 110Ω, 5 watt resistor in this application.

TRANSFORMER (FILAMENT)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC	② 6.3VAC .43A	③ 6.3VAC 7.7A	④ 6.3VAC .6A	TTR-174D			

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	12Ω	Tap ② 33Ω					
T3	93Ω	1000Ω	TTR-181-D	A-8111	A-3000	TSO-1	Hor. Osc. Transformer
T4	415Ω	SEC. 1		A-8117		TFB-1	Vert. Block Osc. Trans.
	Tap ② 176Ω	10.6Ω Tap ③ .6Ω					Hor. Output Trans.
		SEC. 2					
		6Ω					
T5	550Ω	6.7Ω	TTR-153-ID	A-8116	A-3035	TSO-4	Vert. Output Trans.
T6A	14Ω			DY-1			Hor. Deflection Coil
B	63Ω						Vert. Deflection Coil
T7	950Ω						Focus Coil

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	7.3KΩ	3.5Ω	550Ω	.5Ω	Part of TSP-453D	A-8114	A-3931	RO-13	

SPEAKER

ITEM No.	RATINGS: FIELD RES.	RATINGS: V. C. IMP.	REPLACEMENT DATA: TELE-TONE PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	PM	3.5Ω	TSP-463D	4676	46A1 ①	① Remount output transformer.
	CONE DIA.	V. C. DIA.				
SP3	3 7/8" x 5 7/8"	9/16"				

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.200A	37.5Ω	.9 Henry	TTR-106D	C-2325 ①	C-2974 ①	TR-4200①	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	TELE-TONE PART No.	MEISSNER PART No.	
L2	RF Choke	.6Ω				
L3	RF End Inductance	0Ω		TLF-143-D		
L4	RF End Inductance	0Ω		TLF-143-D		
L5	RF Choke	.6Ω				
L6A	Osc. Coil	0Ω		TLF-120-1D		Channel #2
B	Osc. Coil	0Ω		TLF-120-2D		Channel #3
C	Osc. Coil	0Ω		TLF-120-3D		Channel #4
D	Osc. Coil	0Ω		TLF-120-4D		Channel #5
E	Osc. Coil	0Ω		TLF-120-5D		Channel #6
F	Osc. Coil	0Ω		TLF-120-6D		Channel #7
G	Osc. Coil	0Ω		TLF-120-7D		Channel #8
H	Osc. Coil	0Ω		TLF-120-8D		Channel #9
I	Osc. Coil	0Ω		TLF-120-9D		Channel #10
J	Osc. Coil	0Ω		TLF-120-10D		Channel #11
K	Osc. Coil	0Ω		TLF-120-10D		Channel #12
L	Osc. Coil	0Ω		TLF-120-10D		Channel #13
L7	1st Video IF	0Ω				
L8	2nd Video IF	0Ω				
L9	2nd Video IF Plate Choke	1.9Ω				
L10	3rd Video IF	0Ω				
L11	Peaking	5Ω				120 microhenries. Wound on 1.5KΩ resistor. Yellow dot.
L12	Peaking	4.3Ω				100 microhenries. Red dot.
L13	Peaking	5Ω				145 microhenries. Wound on 18KΩ resistor. White dot.
L14	Peaking	2Ω				15 microhenries.
L15	Peaking	6Ω				180 microhenries. Wound on 22KΩ resistor. Green dot.
L16	Sound IF	.5Ω				
L17	Ratio Det. Trans.	4Ω	.5Ω			
L18	Width Cont.	.2Ω				
L19	Hor. Linearity	34Ω				

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	TELE-TONE PART No.	SYLVANIA PART No.		
M1	.200A		NF-5		
M2	.200A		NF-5		
M3	.200A		NF-5		

MISCELLANEOUS

ITEM No.	PART NAME	TELE-TONE PART No.	NOTES
M4	RF Tuner		
M5	Switch		Power On-Off
M6	Fuse		Type GJV, .25A
M7	Ion Trap		
	Trimmer Strip		Locking Range(10-160MMF), Hor. Freq. (40-370MMF), Hor. Drive (40-370MMF)

PHOTOFACT* Folder

WESTINGHOUSE MODEL H217B (CH. V-2146-35DX, V-2137, V-2149)

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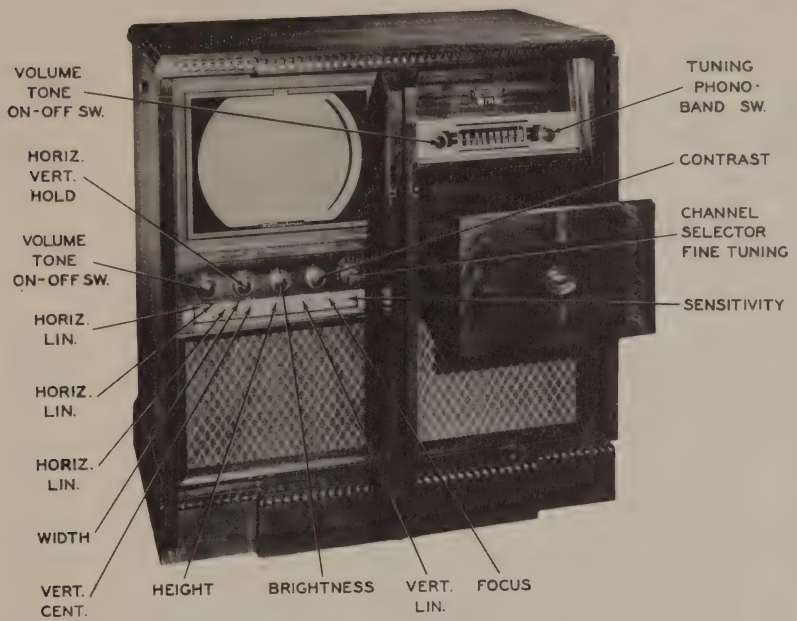
WESTINGHOUSE MODEL H-217B
(Ch. V-2146-35DX, V-2137, V-2149)



TRADE NAME	Westinghouse Model H-217B [Ch. V-2146-35DX (TV), V-2137 (Radio), V-2149 (Audio)]
MANUFACTURER	Westinghouse Electric Corp., Home Radio Div., Sunbury, Pa.
TYPE SET	TV-AM-FM-Phono Combination Receiver
TUBES	Thirty Nine
POWER SUPPLY	110-120 Volts AC
TUNING RANGE	TV Channels 2 thru 13, FM 88-108MC, AM 540-1600KC
RATING	2.54 Amp. at 117 Volts AC (TV), .73 Amp. at 117 Volts AC (Radio)

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RECORD CHANGER ..... WESTINGHOUSE MODEL V9022

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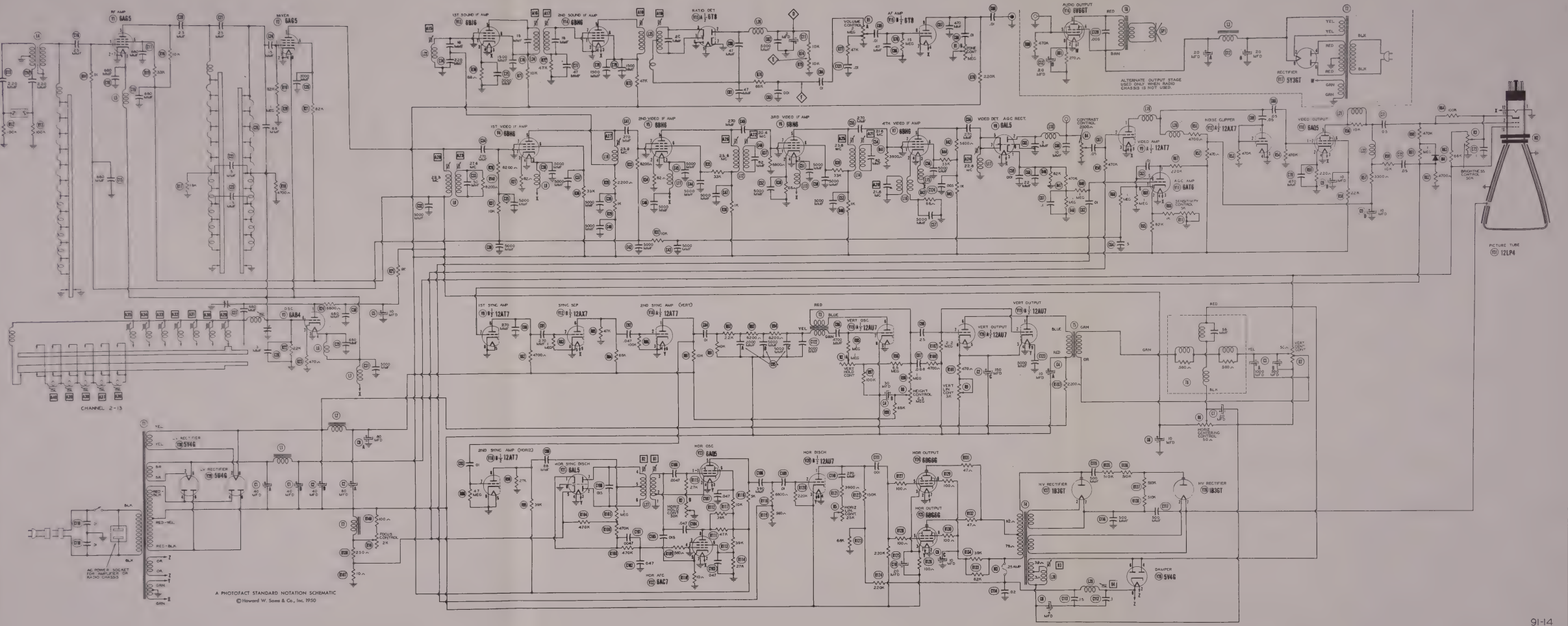
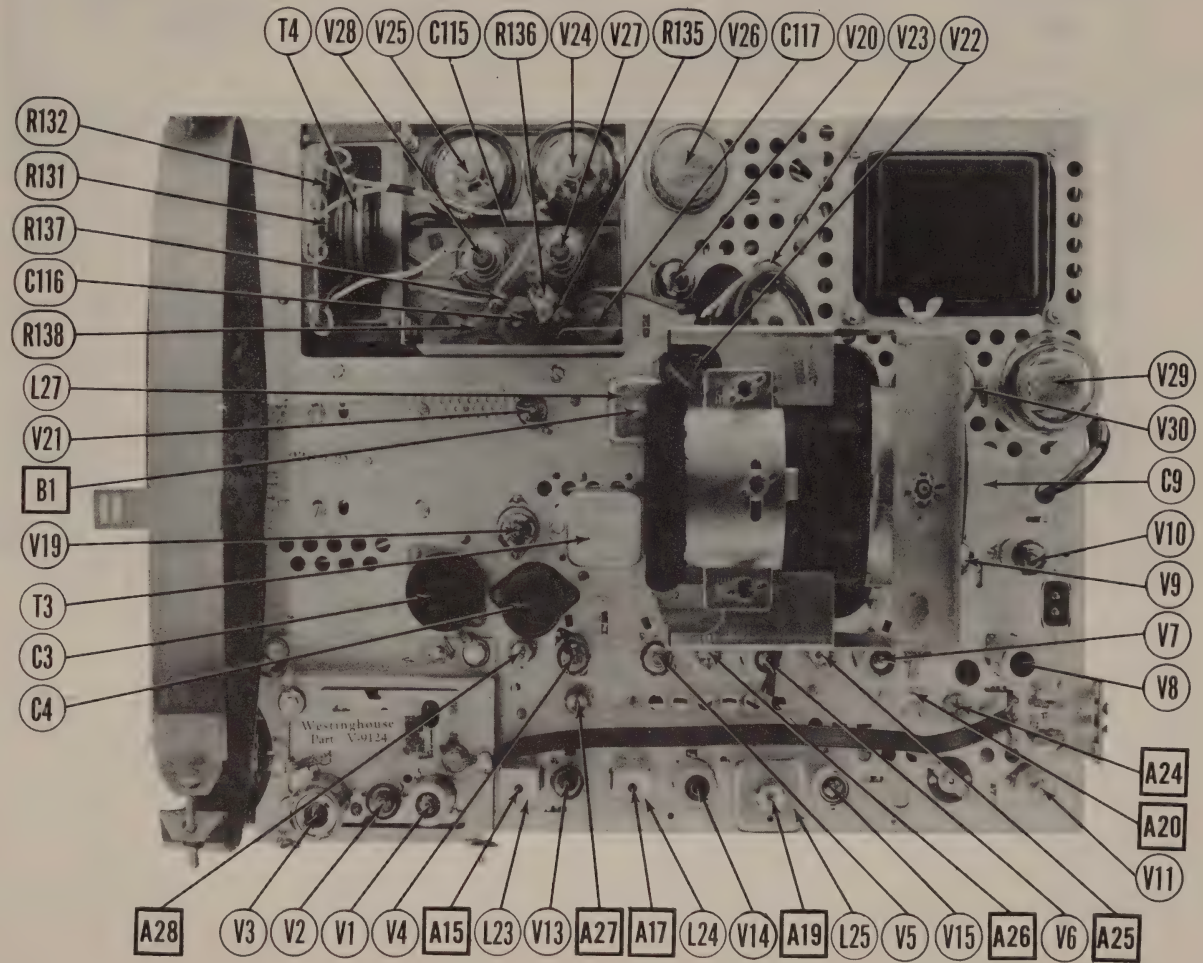
WESTINGHOUSE MODEL H-217B
(Ch. V-2146-35DX, V-2137, V-2149)

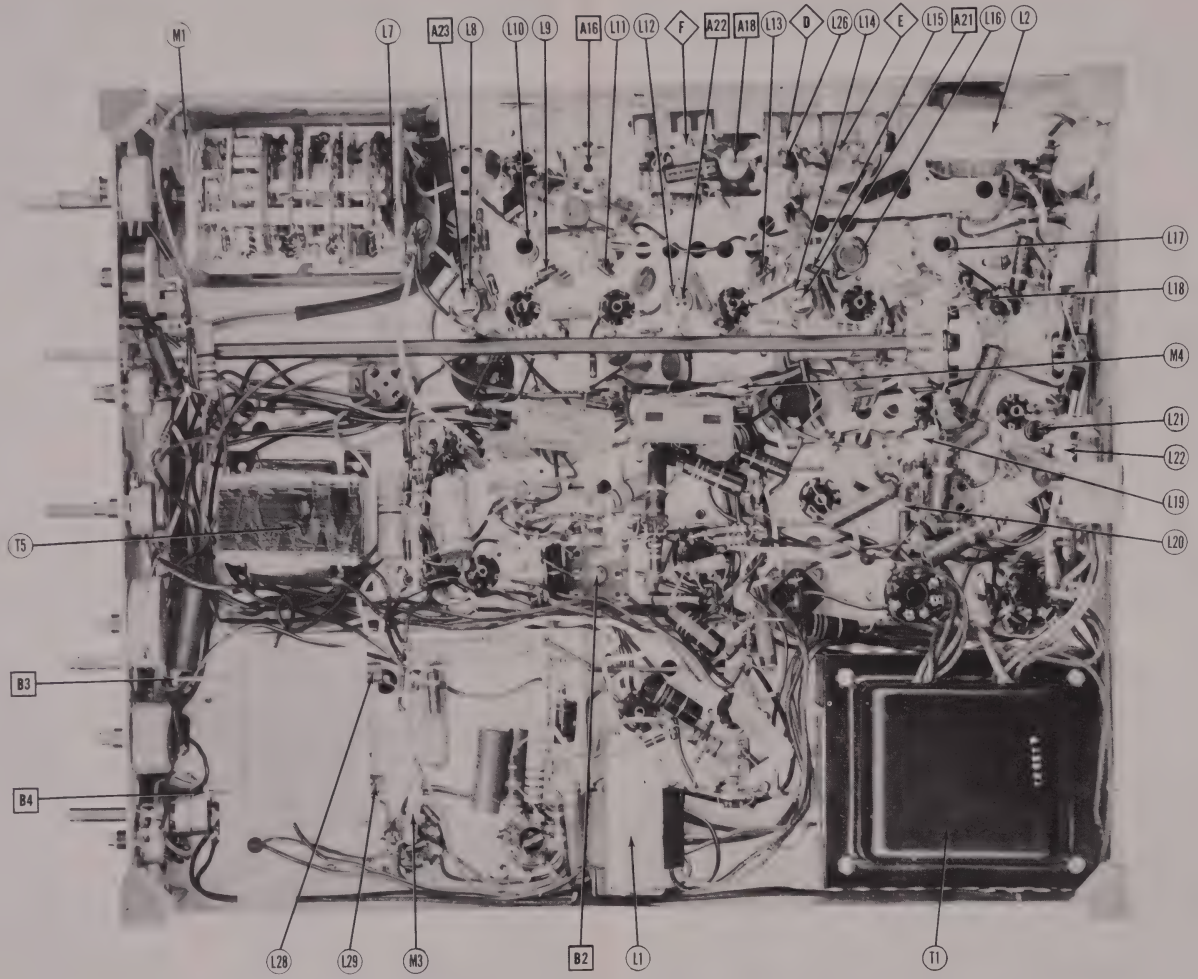


WESTINGHOUSE MODEL H-217B
(Ch. V-2146-35DX, V-2137, V-2149)

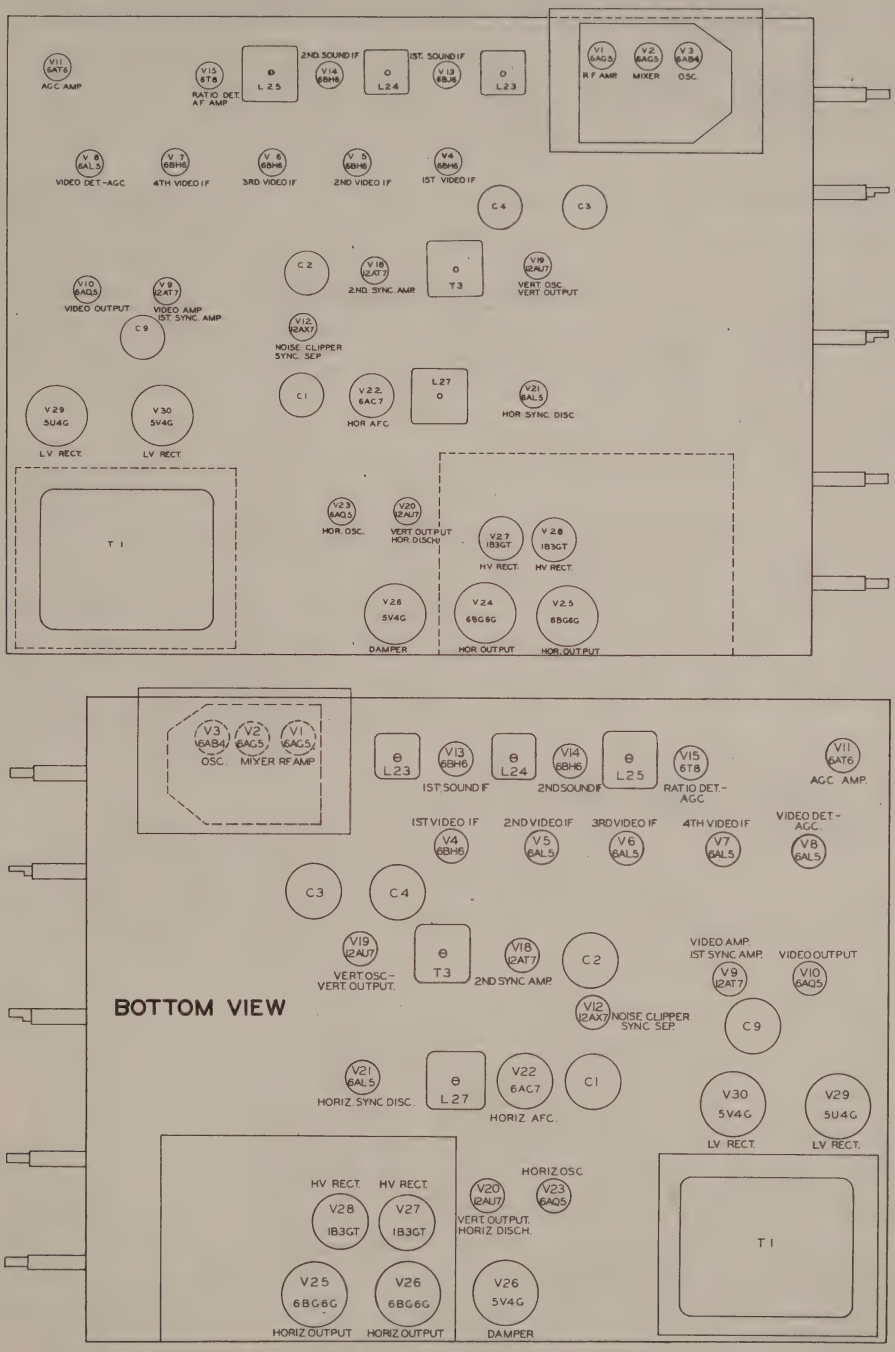
91-14



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

RADIO ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer, turn tuning capacitor fully closed and set pointer at last reference mark at left hand edge of dial. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 1-6BA6 (V34) Low side to chassis.	455KC	AM (center pos.)	Tuning cap fully open	Across voice coil —	A1, A2	Adjust for maximum output.
2	.1MFD	High side to pin 1 6BE6 (V33). Low side to chassis.	"	"	"	"	A3, A4	"
3		Loop	1600KC	"	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4		Loop	1400KC	"	Tune for max. output.	"	A6	Rock tuning cap and adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Before starting step 7, connect two 100KΩ matched resistors (± 5%) connected in series from pin 7 6AL5 (V33) to chassis. (See Schematic). Connect the DC Probe of the VTVM to point B and the common lead to point C.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	1000MMF	High side to pin 1 6BA6 (V34). Low side to chassis.	10.7MC	FM (ext. CCW)	Tuning cap fully open	DC Probe to Point (A) Common to chassis.	A7, A8, A9	Adjust for maximum deflection.
6	1000MMF	High side to pin 7 12AT7 (V32). Low side to chassis.	"	"	"	"	A10, A11	Adjust for maximum deflection.
7	1000MMF	"	"	"	"	DC Probe to Point (B) Common lead to Point (C)	A12	Adjust for zero reading. A positive or negative reading on either side denotes the correct setting. Remove the two 100KΩ resistors.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5	1000MMF	High side to pin 1 6BA6 (V34). Low side to chassis.	10.7MC (450KC Sweep)	FM	Tuning cap fully open	Vertical Amp. to Point (A) Low side to chassis.	A7, A8, A9	Disconnect stabilizer capacitor (C126). Adjust for maximum amplitude and symmetry as per Fig 1.
6	1000MMF	High side to pin 7 12AT7 (V32). Low side to chassis.	"	"	"	"	A10, A11	Adjust for maximum amplitude and symmetry as per Fig 1.
7	1000MMF	"	"	"	"	Vertical Amp. to Point (B) Low side to chassis.	A12	Reconnect stabilizer cap. Adjust so cross-over point occurrs at center of pattern as per Fig 2. If necessary, slightly retouch A7 for maximum amplitude and straightness of cross over lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8	300Ω carbon res.	High side to terminal 1 of antenna strip. Low side to terminal 2.	105MC	FM	105MC	DC Probe to Point (A) Low side to chassis.	A13	Adjust for maximum deflection.
9	300Ω carbon res.	"	"	"	Tune for max. output.	"	A14	Adjust for maximum deflection.

FIG. 1

FIG. 2

TV ALIGNMENT INSTRUCTIONS

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Attenuate the signal generator to give approximately a 5 volt reading on the VTVM using the 10 volt scale.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10	500MMF	High side to pin 1 (Grid) of 6AG5 (V2). Low side to chassis.	21.6MC	3	DC Probe to Point (D). Common to chassis.	A15, A16, A17, A18	Adjust for maximum deflection.
11	500MMF	"	"	"	DC Probe to Point (F). Common to Point (E).	A19	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10	500MMF	High side to pin 1 (Grid) of 6AG5 (V2). Low side to chassis.	21.6MC (1MC Sweep)	21.45MC 21.6MC 21.8MC	3	Vert. Amp. to Point (D). Low side to chassis.	A15, A16, A17, A18	Disconnect stabilizer cap (C11). Adjust for maximum amplitude and symmetry as per Fig 3.
11	500MMF	"	"	21.35MC 21.6MC 21.85MC	3	Vert. Amp. to Point (C). Low side to chassis.	A19	Reconnect stabilizer cap. Adjust A19 so 21.6MC marker appears at center of pattern as per Fig 4.

VIDEO IF ALIGNMENT

Connect the bias unit shown in Fig 5 to the AGC line.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12	500MMF	High side to pin 1 (Grid) of 6AG5 (V2). Low side to chassis.	21.6MC	3	DC Probe to Video Test Jack on chassis. Common to chassis.	A20	Adjust for minimum deflection.
13	500MMF	"	21.6MC	"	"	A21	Adjust for minimum deflection.
14	500MMF	"	20.4MC	"	"	A22	Adjust for minimum deflection.
15	500MMF	"	27.6MC	"	"	A23	Adjust for minimum deflection.
16	500MMF	"	22.8MC	"	"	A24	Adjust for maximum deflection.
17	500MMF	"	23.8MC	"	"	A25	Adjust for maximum deflection. If A25 required adjustment, repeat step 13.
18	500MMF	"	25.6MC	"	"	A25	Adjust for maximum deflection. If A26 required adjustment, repeat step 14.
19	500MMF	"	25.9MC	"	"	A27	Adjust for maximum deflection.
20	500MMF	"	22.3MC	"	"	A28	Adjust for maximum deflection. If A28 required adjustment, repeat step 15.

OVERALL VIDEO IF RESPONSE CHECK

Leave the bias unit connected for this visual check.
Shunt the vertical amplifier connections of the oscilloscope with a 500MMF capacitor and insert a 200KΩ resistor in series with the high side lead.
Connect the horizontal amplifier to the synchronized sweep voltage output of the signal generator.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21	500MMF	High side to pin 1 (Grid) of 6AG5 (V2). Low side to chassis.	25MC (12MC Sweep)	21.6MC 22.5MC 23.0MC 25.3MC 26.1MC 27.0MC	3	Vert. Amp. thru 200KΩ to video test jack. Low side to chassis. (See instructions above)	A20 thru A28	Check to see that markers appear on pattern obtained as per Fig 6. SLIGHT adjustment of A24 and A25 will usually properly place the markers. If readjustment of A25, A26 and A28 is made their respective traps must be rechecked. Do not adjust any trap except A22 to correct the response curve.

TV OSCILLATOR ALIGNMENT

The RF amplifier and mixer circuits of the tuner are very stable and normally do not require adjustment in the field.
When adjusting the oscillator circuits, turn the fine tuning control to the mid point of its tuning range.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
22	Two 150Ω carbon res.	Across antenna terminals with 150Ω in each lead.	215.75MC (Unmod.)	13	DC Probe to Point (F). Common to Point (E).	A29	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			209.75MC	12		A30	
			203.75MC	11		A31	
			197.75MC	10		A32	
			191.75MC	9		A33	
			185.75MC	8		A34	
			179.75MC	7		A35	
			87.75MC	6		A36	
			81.75MC	5		A37	
			71.75MC	4		A38	
			65.75MC	3		A39	
			59.75MC	2		A40	

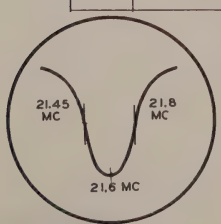


FIG.3

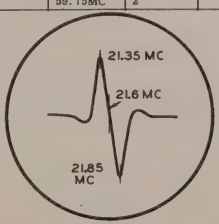


FIG. 4

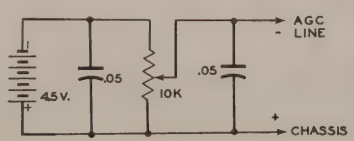


FIG. 5

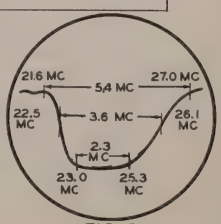
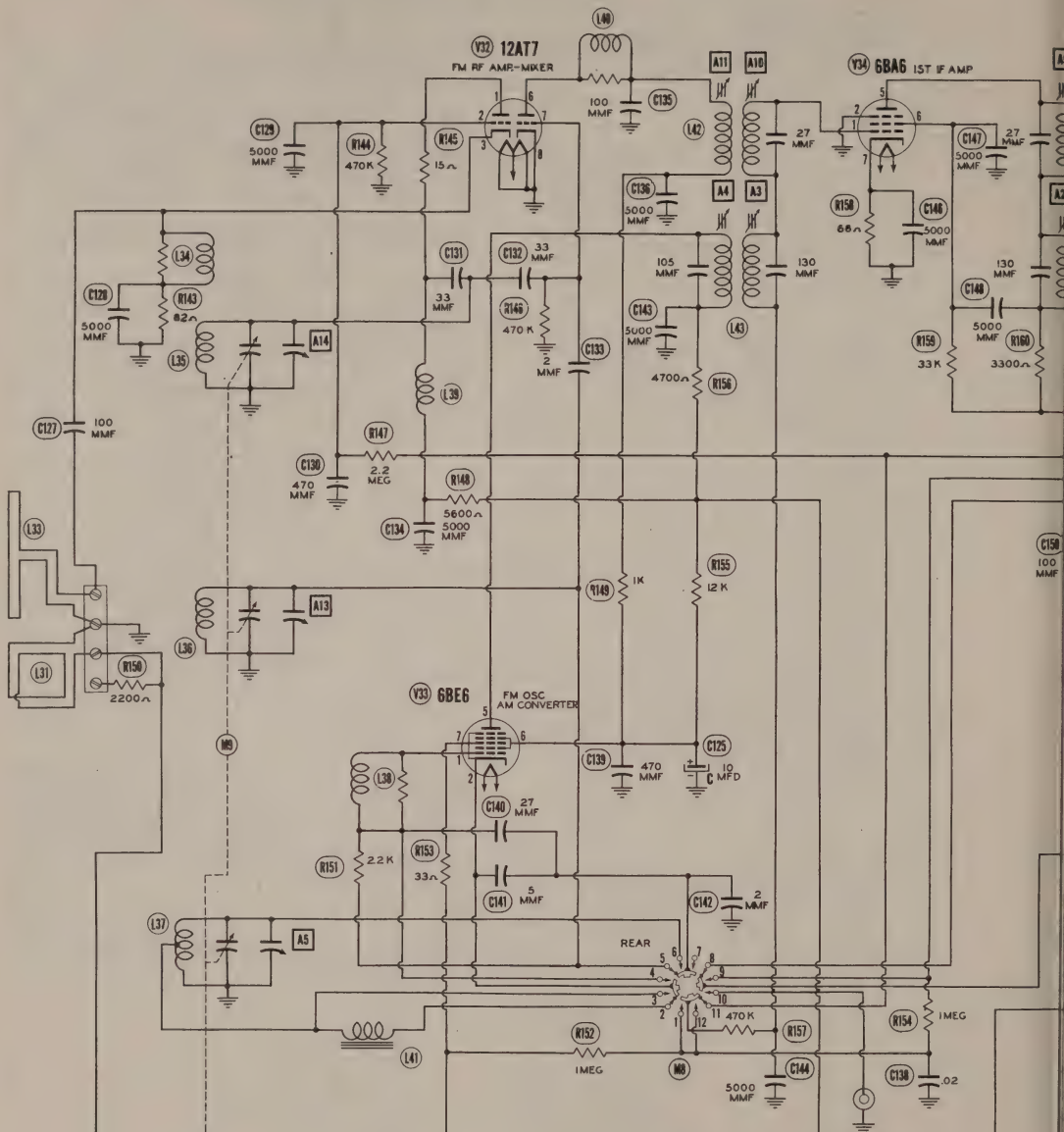


FIG. 6



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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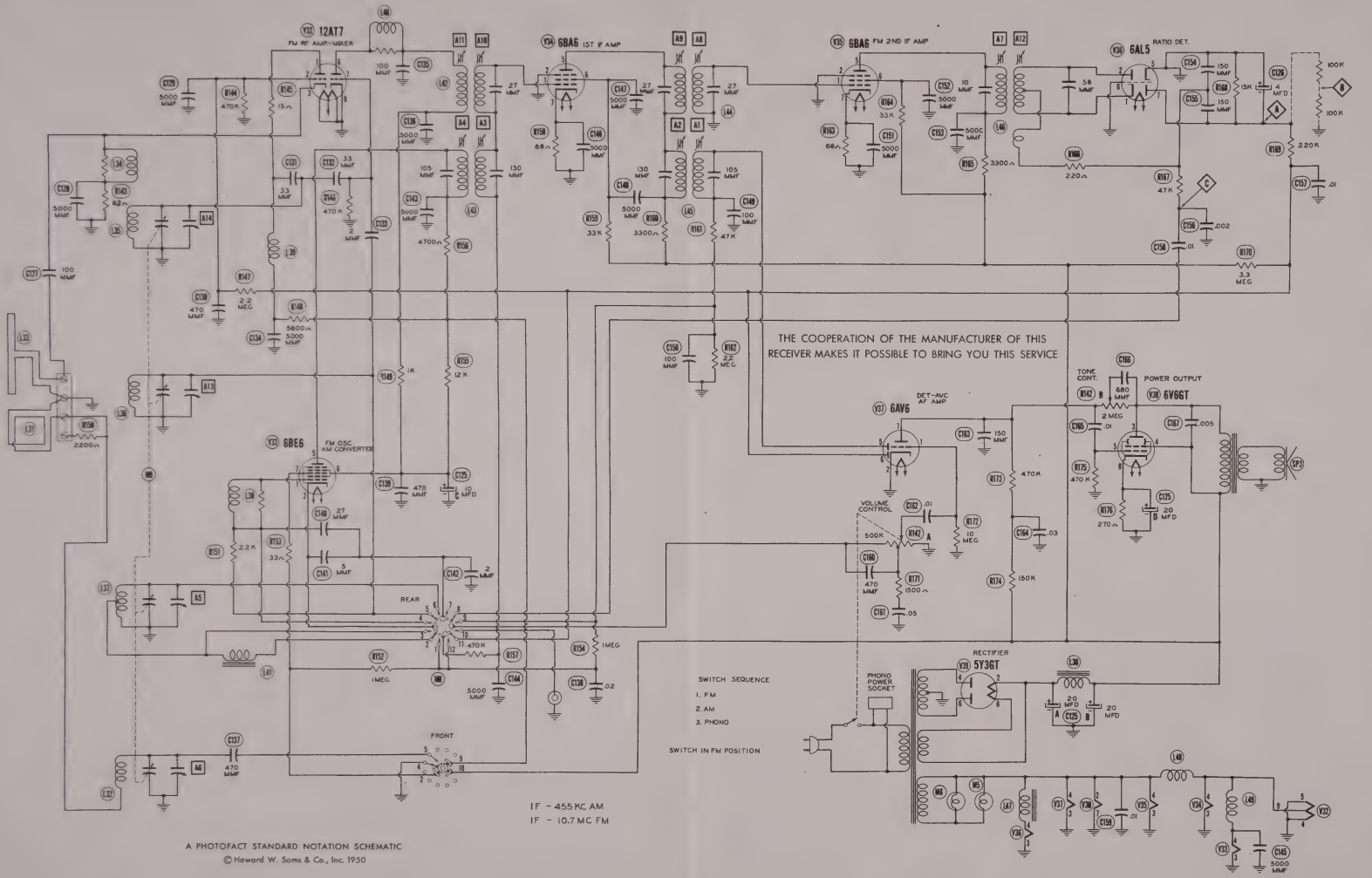
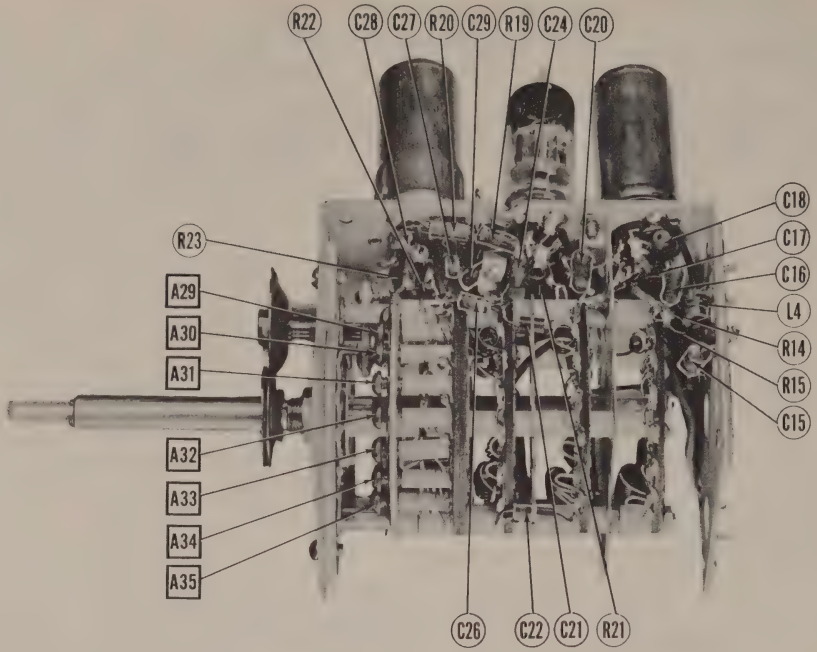
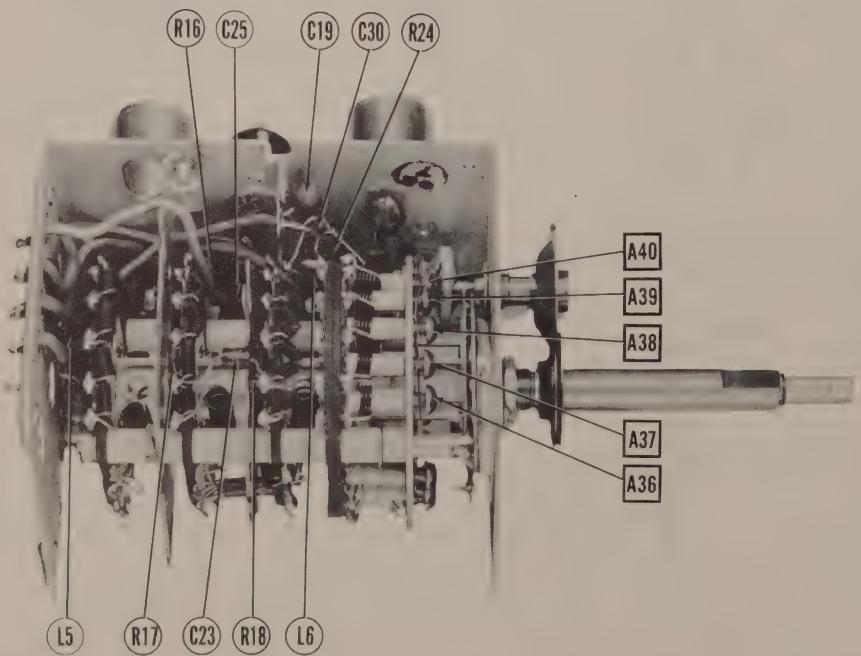
RADIO CHA



RADIO CHASSIS-V2137



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

RADIO CHASSIS-TOP VIEW

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.9VDC	0V.	6.3VAC	0V.	220VDC	150VDC	0V.		
V 2	6AG5	-1.6VDC	0V.	0V.	6.3VAC	280VDC	125VDC	0V.		
V 3	6AB4	225VDC	0V.	0V.	6.3VAC	230VDC	§-2.6VDC	3.2VDC		
V 4	6BH6	-2.3VDC	.8VDC	6.3VAC	0V.	230VDC	175VDC	0V.		
V 5	6BH6	-.5VDC	.7VDC	6.3VAC	0V.	245VDC	155VDC	0V.		
V 6	6BH6	0V.	.7VDC	6.3VAC	0V.	245VDC	155VDC	0V.		
V 7	6BH6	0V.	.6VDC	6.3VAC	0V.	215VDC	175VDC	0V.		
V 8	6AL5	.6VDC	-.4VDC	6.3VAC	0V.	0V.	0V.	0V.		
V 9	12AT7	200VDC	-.6VDC	0V.	0V.	0V.	185VDC	-.2VDC	0V.	6.3VAC
V 10	6AQ5	0V.	7.7VDC	6.3VAC	0V.	120VDC	175VDC	0V.		
V 11	6AT6	0V.	4.2VDC 22VDC	6.3VAC	0V.	-.1VDC	-.1VDC	230VDC		
V 12	12AX7	-.6VDC	-.6VDC	0V.	0V.	0V:	87VDC	-.4VDC	0V.	6.3VAC
V 13	6BJ6	0V.	1VDC	6.3VAC	0V.	120VDC	120VDC	0V.		
V 14	6BH6	-.7VDC	0V.	6.3VAC	0V.	70VDC	70VDC	0V.		
V 15	6T8	-.4VDC	-.8VDC	-.4VDC	6.3VAC	0V.	0V.	0V.	-.2VDC	90VDC
V 16	6V6GT	0V.	0V.	260VDC	280VDC	0V.	0V.	6.3VAC	12VDC	
V 17	5Y3GT	0V.	290VDC	0V.	280VAC	0V.	280VAC	0V.	290VDC	
V 18	12AT7	185VDC	-.8VDC	0V.	0V.	0V.	75VDC	-.7VDC	0V.	6.3VAC
V 19	12AU7	▲340VDC	▲0V.	▲11VDC ▲20VDC	0V.	0V.	▲29VDC ▲90VDC	▲-12VDC	▲0V.	6.3VAC
V 20	12AU7	▲75VDC	▲-8.3VDC	▲0V.	0V.	0V.	▲340VDC	▲0V.	▪11VDC ▲20VDC	6.3VAC
V 21	6AL5	-1VDC	-4VDC	6.3VAC	0V.	-1.9VDC	0V.	-4.9VDC		
V 22	6AC7	0V.	6.3VAC	0V.	-.9VDC	0V.	95VDC	0V.	235VDC	
V 23	6AQ5	-28VDC	.3VDC	6.3VAC	0V.	175VDC	165VDC	-27VDC		
V 24	6BG6G	0V.	0V.	▲9.5VDC	▲-10VDC	▲-10VDC	165VDC	6.3VAC	165VDC	TOP CAP
V 25	6BG6G	560VDC	0V.	▲9.5VDC	▲-10VDC	▲-10VDC	165VDC	6.3VAC	165VDC	TOP CAP
V 26	5V4G	0V.	490VDC	490VDC	280VDC	0V.	280VDC	90VDC	490VDC	
V 27	1B3GT	* DO NOT MEASURE.								
V 28	1B3GT	* DO NOT MEASURE.								
V 29	5U4G	0V.	280VDC	0V.	340VAC	130VDC	340VAC	280VDC	280VDC	
V 30	5V4G	0V.	320VDC	280VDC	340VAC	0V.	340VAC	0V.	320VDC	
V31	12LP4	0V.	0V.	PIN 10 290VDC	PIN 11 125VDC	PIN 12 6.3VAC				
† V32	12AT7	200VDC	.1VDC	1VDC	0V.	0V.	117VDC	-2.2VDC	0V.	6.3VAC
† V33	6BE6	§-6.6VDC	0V.	0V.	6.3VAC	250VDC	105VDC	0V.		
♦ V33	6BE6	§-8.8VDC	0V.	0V.	6.3VAC	250VDC	120VDC	-.1VDC		
♦ V34	6BA6	-.1VDC	0V.	0V.	6.3VAC	235VDC	107VDC	1.1VDC		
† V35	6BA6	0V.	0V.	0V.	6.3VAC	235VDC	110VDC	1.2VDC		
† V36	6AL5	-.8VDC	0V.	0V.	6.3VAC	0V.	0V.	-.4VDC		
♦ V37	6AV6	-.4VDC	0V.	0V.	6.3VAC	-.3VDC	.7VDC	90VDC		
V38	6V6GT	0V.	6.3VAC	250VDC	265VDC	0V.	220VDC	0V.	13.5VDC	
V39	5Y3GT	0V.	300VDC	0V.	300VAC	0V.	300VAC	0V.	300VDC	

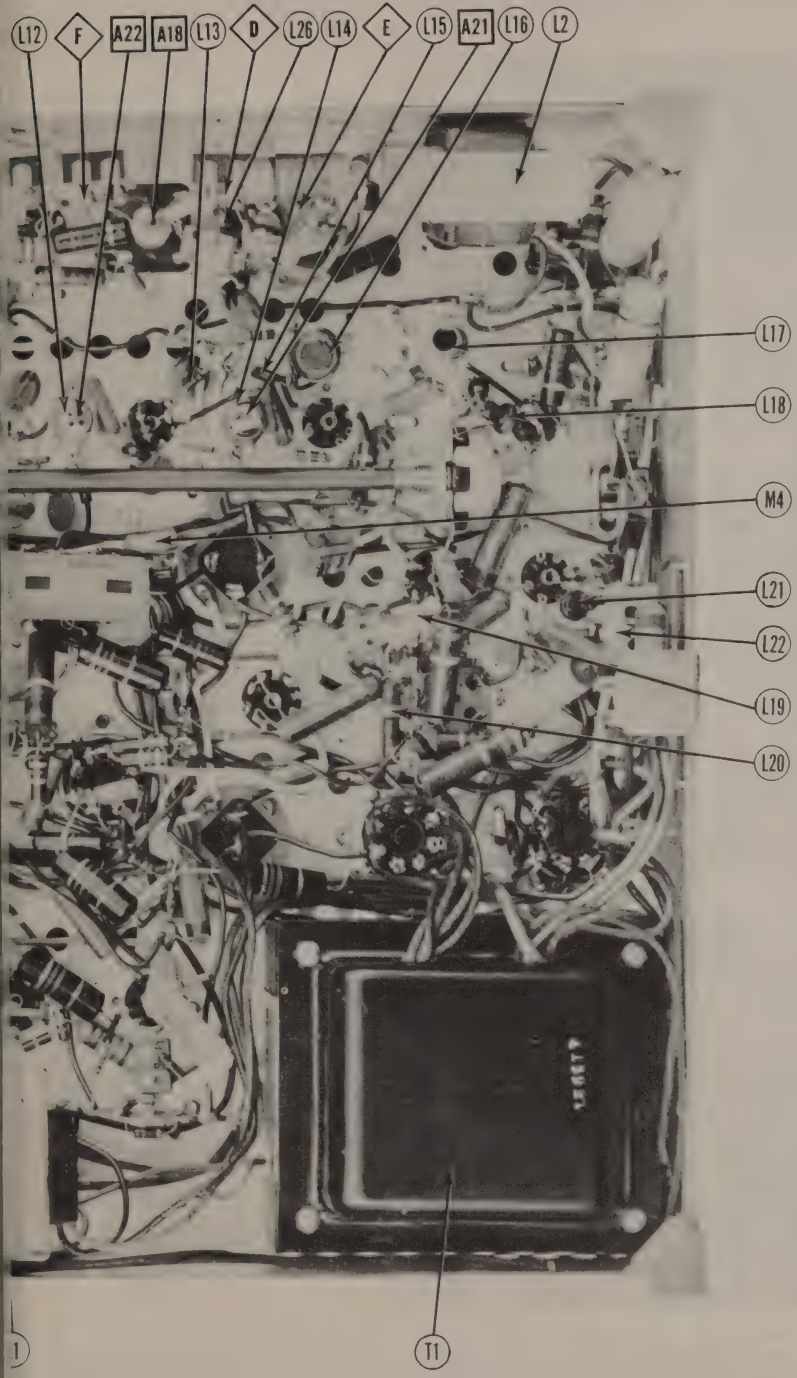
§ TAKEN WITH VACUUM TUBE VOLTMETER.
† TAKEN IN "FM" POSITION.
♦ TAKEN IN "AM" POSITION.
* DO NOT MEASURE.
▲ MEASURED FROM PIN 3 OF V20.

RESISTANCE READINGS

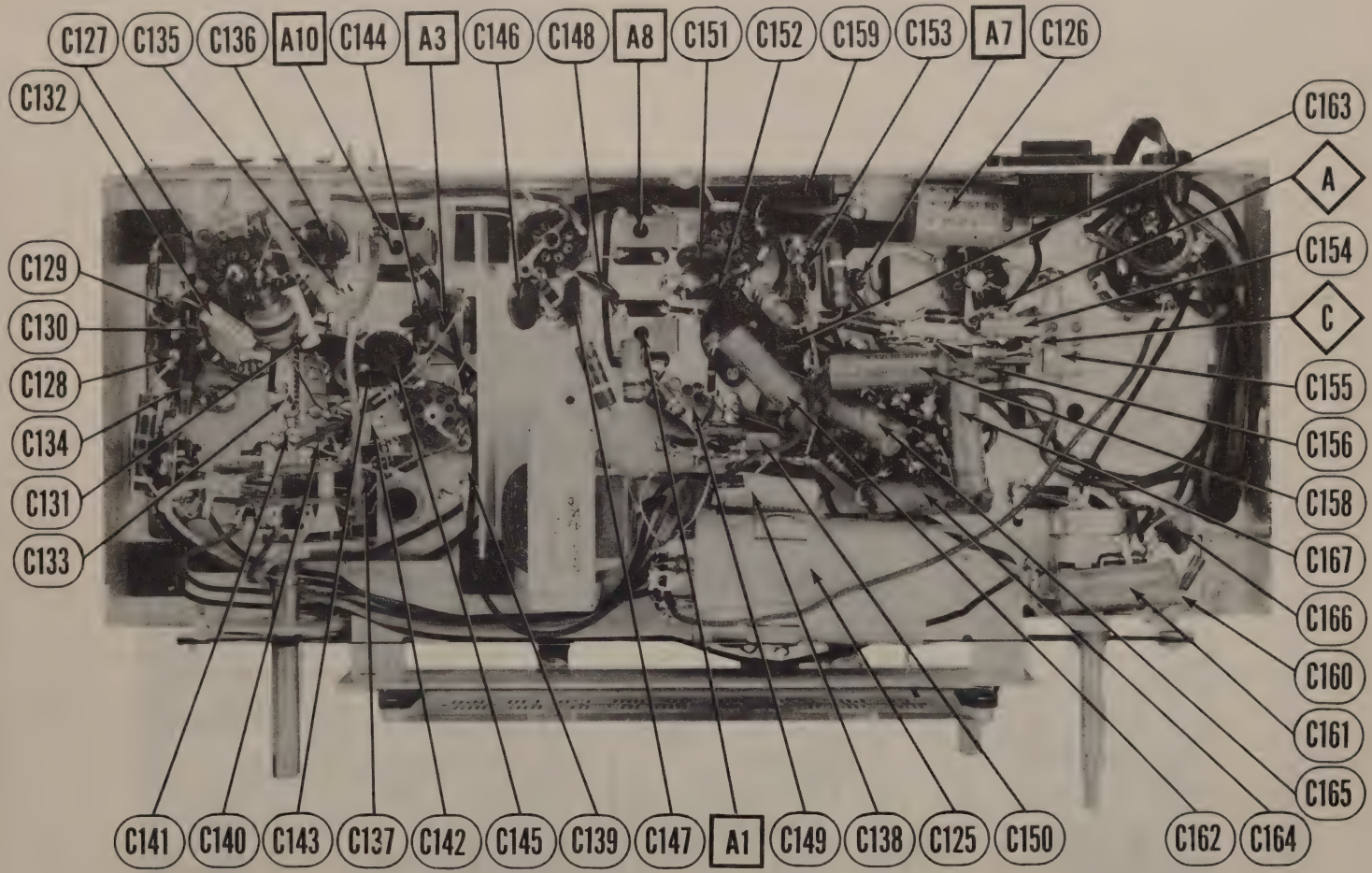
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	2 Meg.	0Ω	.1Ω	0Ω	#10KΩ	#33KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	.1Ω	0Ω	#300Ω	#82KΩ	0Ω		
V 3	6AB4	#8KΩ	Inf.	0Ω	.1Ω	#8KΩ	22KΩ	470Ω		
V 4	6BH6	2 Meg.	82Ω	.1Ω	0Ω	†3.3KΩ	†33KΩ	0Ω		
V 5	6BH6	2 Meg.	82Ω	.1Ω	0Ω	†1.1KΩ	†34KΩ	0Ω		
V 6	6BH6	6.8KΩ	68Ω	.1Ω	0Ω	†1KΩ	†34KΩ	0Ω		
V 7	6BH6	3.9KΩ	68Ω	.1Ω	0Ω	†6.7KΩ	†34KΩ	0Ω		
V 8	6AL5	80KΩ	2.5KΩ	.1Ω	0Ω	.2Ω	0Ω	.2Ω		
V 9	12AT7	†5.5KΩ	470KΩ	0Ω	0Ω	0Ω	†4.8KΩ	4.7KΩ	0Ω	.1Ω
V 10	6AQ5	470KΩ	220Ω	.1Ω	0Ω	†3.9KΩ	†22KΩ	470KΩ		
V 11	6AT6	1.5 Meg.	6KΩ 1000Ω	.1Ω	0Ω	1 Meg.	1 Meg.	†220KΩ		
V 12	12AX7	470KΩ	470KΩ	0Ω	0Ω	0Ω	†32KΩ	1 Meg.	0Ω	.1Ω
V 13	6BJ6	.2Ω	68Ω	.1Ω	0Ω	†10KΩ	†10KΩ	0Ω		
V 14	6BH6	47KΩ	0Ω	.1Ω	0Ω	†47KΩ	†47KΩ	0Ω		
V 15	6T8	Inf.	20KΩ	Inf.	.1Ω	0Ω	0Ω	0Ω	15 Meg.	†220KΩ
V 16	6V6GT	0Ω	0Ω	▲580Ω	▲230Ω	470KΩ	Inf.	.1Ω	¶70Ω	
V 17	5Y3GT	0Ω	90KΩ	Inf.	260Ω	Inf.	280Ω	Inf.	90KΩ	
V 18	12AT7	†10KΩ	100KΩ	0Ω	0Ω	0Ω	†22KΩ	4.7 Meg.	0Ω	.1Ω
V 19	12AU7	†2.5KΩ	2.2 Meg.	3.5KΩ 900Ω	0Ω	0Ω	†2.3 Meg. †1 Meg.	1.2 Meg.	▲0Ω	.1Ω
V 20	12AU7	¶360KΩ	220KΩ	▲0Ω	0Ω	0Ω	†2.5KΩ	2.2 Meg.	3.5KΩ 900Ω	.1Ω
V 21	6AL5	1 Meg.	1.5 Meg.	.1Ω	0Ω	10Ω	0Ω	1.5 Meg.		
V 22	6AC7	0Ω	.1Ω	0Ω	1.5 Meg.	10Ω	†24KΩ	0Ω	†24KΩ	
V 23	6AQ5	27KΩ	10Ω	.1Ω	0Ω	†5KΩ	†10KΩ	27KΩ		
V 24	6BG6G	Inf.	0Ω	▲100Ω	220KΩ	220KΩ	¶25KΩ	.1Ω	¶25KΩ	TOP CAP ¶95Ω
V 25	6BG6G	¶1Ω	0Ω	▲100Ω	220KΩ	220KΩ	¶25KΩ	.1Ω	¶25KΩ	TOP CAP ¶95Ω
V 26	5V4G	Inf.	¶0Ω	¶8Ω	#¶70Ω	Inf.	#270Ω	100MΩ	100KΩ	
V 27	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ¶180Ω
V 28	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOPCAP ¶Inf.
V 29	5U4G	0Ω	18KΩ	Inf.	▲18Ω	45KΩ	▲19Ω	45KΩ	18KΩ	
V 30	5V4G	0Ω	45KΩ	18KΩ	▲18Ω	Inf.	▲19Ω	Inf.	45KΩ	
V31	12LP4	0Ω	■550KΩ	PIN 10 #220Ω	PIN 11 130KΩ	PIN 12 .1Ω				
† V32	12AT7	††6KΩ	450KΩ	82Ω	0Ω	0Ω	††14KΩ	470KΩ	0Ω	.1Ω
‡ V33	6BE6	22KΩ	1Ω	0Ω	.1Ω	††5KΩ	††13KΩ	33Ω		
♦ V33	6BE6	22KΩ	1Ω	0Ω	.1Ω	††5KΩ	††13KΩ	2.5Meg.		
♦ V34	6BA6	1.2Meg.	0Ω	0Ω	.1Ω	††4KΩ	††34KΩ	68Ω		
† V35	6BA6	.5Ω	0Ω	0Ω	.1Ω	††3.5KΩ	††34KΩ	68Ω		
† V36	6AL5	Inf.	Inf.	0Ω	.1Ω	0Ω	0Ω	15KΩ		
♦ V37	6AV6	10 Meg.	0Ω	0Ω	.1Ω	470KΩ	200KΩ	††620KΩ		
V38	6V6GT	0Ω	.1Ω	††600Ω	††200Ω	470KΩ	††150KΩ	0Ω	270Ω	
V39	5Y3GT	Inf.	90KΩ	Inf.	80Ω	Inf.	85Ω	Inf.	90KΩ	

▲ MEASURED FROM PIN 3 OF V20.
▲ MEASURED FROM PIN 8 OF V17.
■ READING DEPENDS ON POLARITY OF METER.
†† MEASURED FROM PIN 2 OF V39.
† TAKEN IN "FM" POSITION.
♦ TAKEN IN "AM" POSITION.
‡ MEASURED FROM PIN 8 OF V29.
# MEASURED FROM PIN 8 OF V30.
¶ MEASURED FROM PIN 8 OF V26.

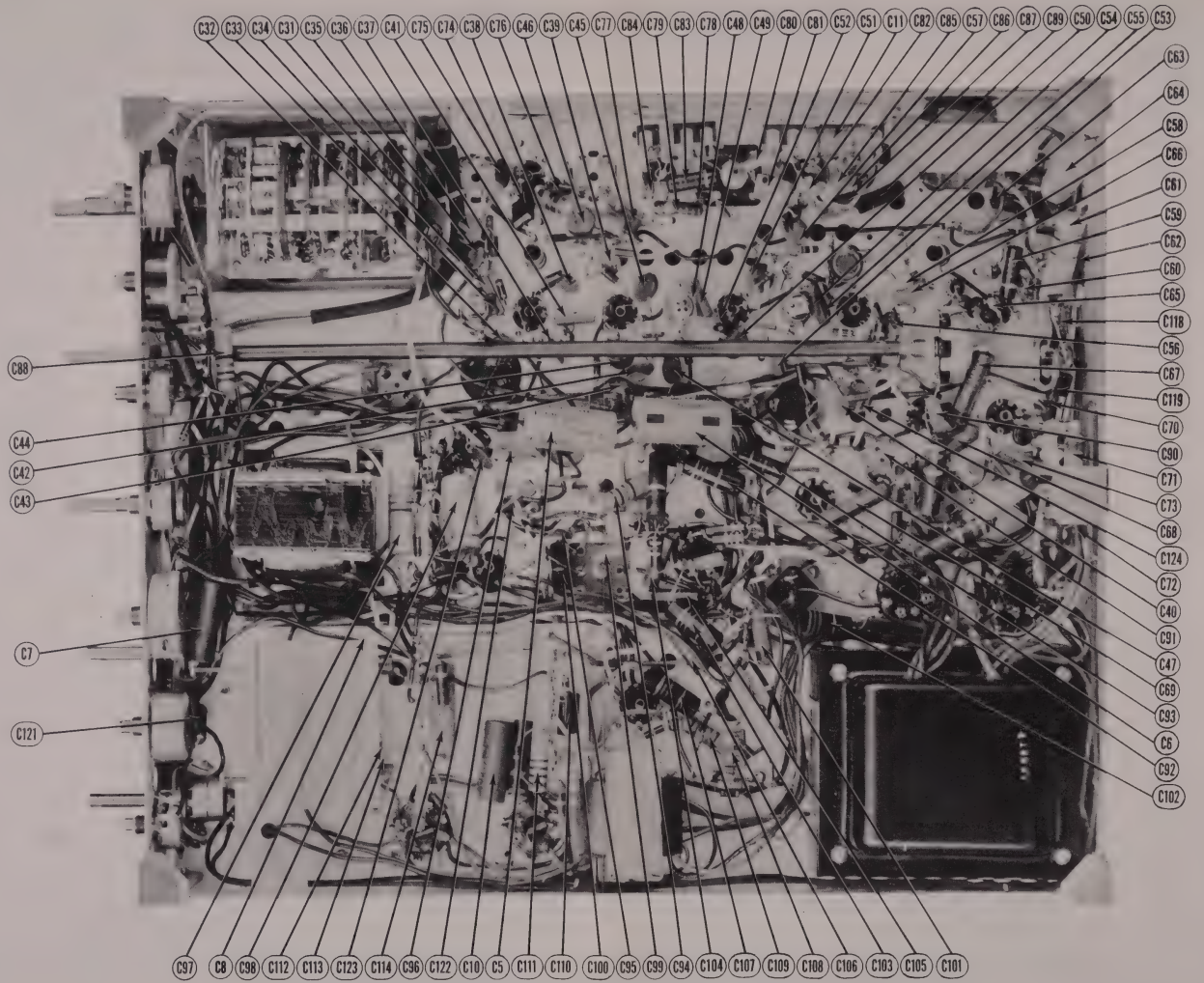
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



)R AND ALIGNMENT IDENTIFICATION



RADIO CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION



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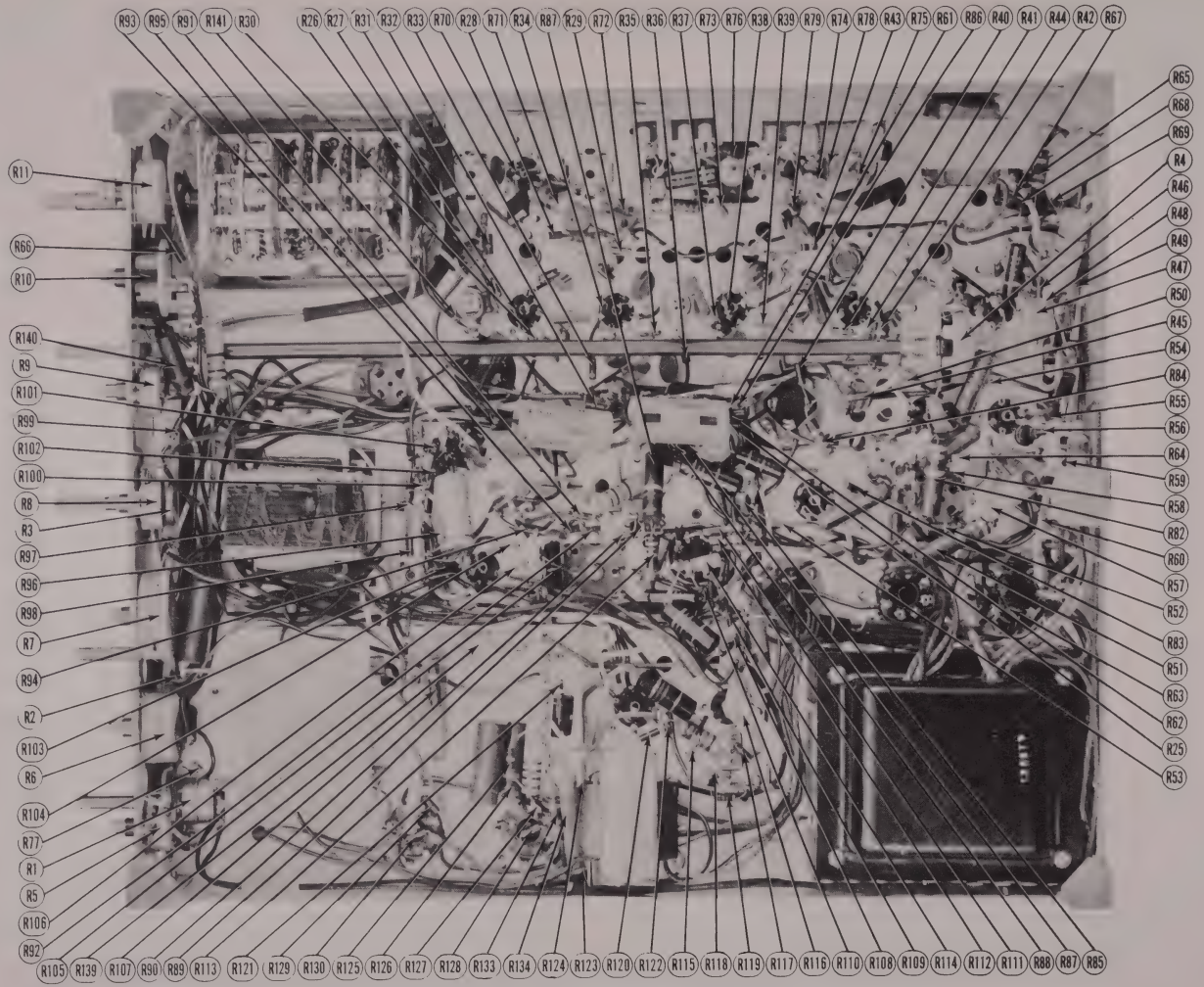

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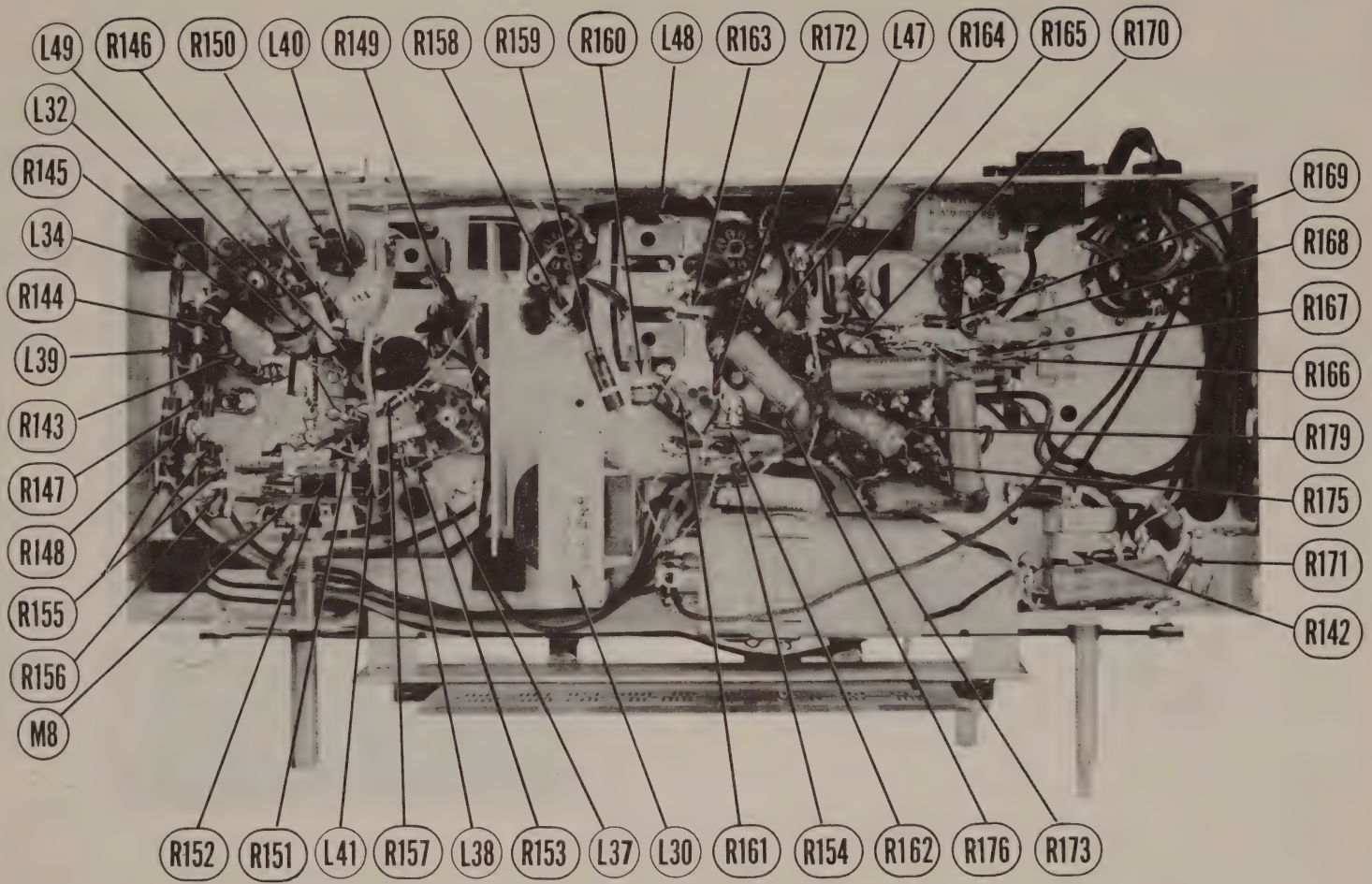

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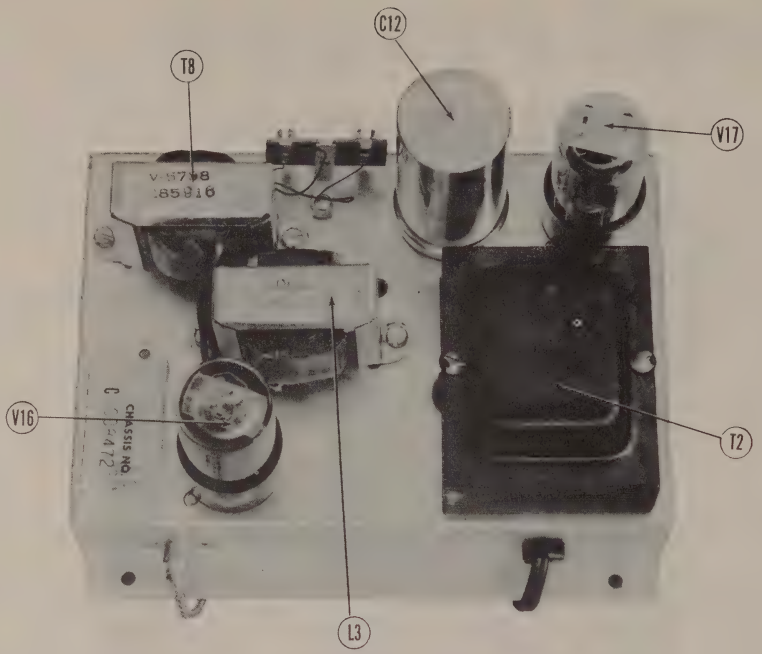
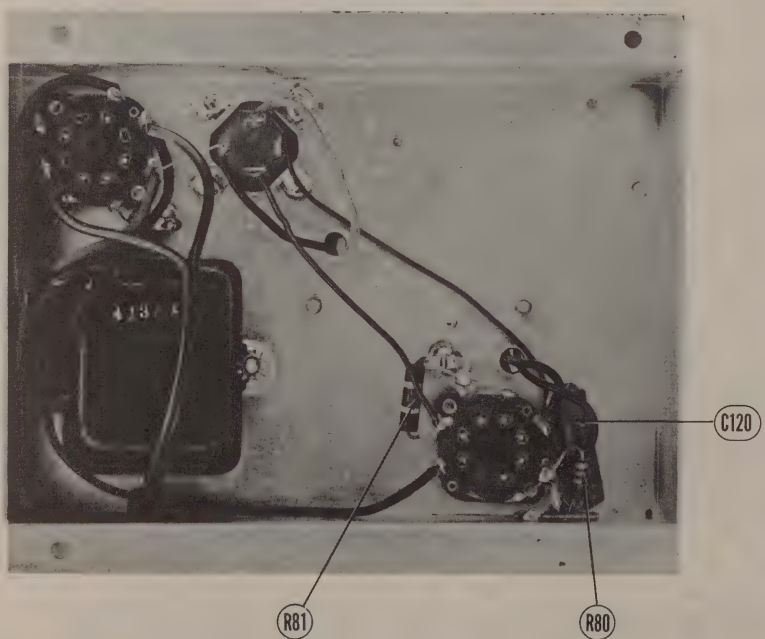


AUDIO CHASSIS–TOP VIEW



AUDIO CHASSIS-BOTTOM VIEW

TV PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		WESTINGHOUSE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6AB4	6AB4	5CE	
V4	1st Video IF	6BH6	6BH6	7CM	
V5	2nd Video IF	6BH6	6BH6	7CM	
V6	3rd Video IF	6BH6	6BH6	7CM	
V7	4th Video IF	6BH6	6BH6	7CM	
V8	Video Det. -AGC Rectifier	6AL5	6AL5	6BT	
V9	Video Amp. -1st Sync. Amp.	12AT7	12AT7	9A	
V10	Video Output	6AQ5	6AQ5	7BZ	
V11	AGC Amp.	6AT6	6AT6	7BT	
V12	Noise Clipper-Sync. Sep.	12AX7	12AX7	9A	
V13	1st Sound IF	6BJ6	6BJ6	7CM	
V14	2nd Sound IF	6BH6	6BH6	7CM	
V15	Ratio Det. -AF Amp.	6T8	6T8	9E	
V16	Audio Output	6V6GT	6V6GT	7AC	
V17	Rectifier	5Y3GT	5Y3GT	5T	
V18	2nd Sync. Amp.	12AT7	12AT7	9A	
V19	Vert. Osc. -Output	12AU7	12AU7	9A	
V20	Vert. Output-Hor. Disch.	12AU7	12AU7	9A	
V21	Hor. Sync. Disc.	6AL5	6AL5	6BT	
V22	Hor. AFC	6AC7	6AC7	8N	
V23	Hor. Osc.	6AQ5	6AQ5	7BZ	
V24	Hor. Output	6BG6G	6BG6G	5BT	
V25	Hor. Output	6BG6G	6BG6G	5BT	
V26	Damper	5V4G	5V4G	5L	
V27	HV Rectifier	1B3GT	1B3GT	3C	
V28	HV Rectifier	1B3GT	1B3GT	3C	
V29	LV Rectifier	5U4G	5U4G	5T	
V30	LV Rectifier	5V4G	5V4G	5L	
V31	Picture Tube	12LP4	12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Westinghouse PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	500	V-5894	AF88K		TVL-20	▲ Filter
B	40	500					▲ Filter
C2A	80	400	V-5892	AF168J30B		TVL-24	▲ Filter
B	40	400					■ Filter
C	150	50					▲ Vert. Output Cathode Bypass
C3A	1000	6	V-5893	AFN200100S		TVL-10	▲ Vert. Cent. Cont. Bypass
B	500	6					▲ Hor. Cent. Cont. Bypass
C4A	10	400	V-5897	AF333J †		TVL-15	■ Vert. Output Decoupling
B	30	400					▲ Vert. Osc. Decoupling
C5	10	350	V-5985	PRS350/12		TVA-21	Decoupling
C6	10	350	V-5985	PRS350/12		TVA-21	Decoupling
C7	20	25	V-3236	PRS25/25		TVA-15	Hor. Cent. Cont. Bypass
C8	4	150	V-4885				Damper Filter
C9A	80	350	V-5891	AF16222H			▲ Filter
B	10	350					■ V. Output Screen Bypass
C	10	350					▲ Hor. Output Screen Bypass
D	10	350					Decoupling
C10	20	25	V-3236	PRS25/25		TVA-15	Hor. Output Cathode Bypass
C11	2	50	V-4880	PRS150/4		TVA-12	Stabilizing Cap.
C12A	20	400	V-6121	AF444J4A		EL-442	▲ Filter
B	20	400					■ Filter
C	20	25					Output Cathode Bypass
C13	220	500	RCM20B221M	1468-00025	GP2K-220	1FM-325	Ant. Coupling
C14	220	500	RCM20B221M	1468-00025	GP2K-220	1FM-325	Ant. Coupling
C15	680			GP680M	GP2K-680		AGC Filter
C16	25			GP25M	GP1K-25		RF Coupling
C17	680			GP680M	GP2K-680		RF Screen Bypass
C18	680			GP680M	GP2K-680		RF Filament Bypass
C19	680			GP680M	GP2K-680		RF Bypass
C20	25			GP25M	GP1K-25		RF Coupling
C21	.25						RF Coupling
C22	.5						RF Coupling
C23	1.5				NPOK-1.5		RF Coupling
C24	15			GP15M	GP1K-15		RF Coupling
C25	5000			BPD-5	811-005	29C1	Mixer Screen Bypass
C26	.68						Osc. Coupling
C27	680			GP680M	GP2K-680		Osc. Feedback
C28	.3			CN3DN150	N150K-3		Fixed Trimmer
C29	680			GP680M	GP2K-680		Osc. Filament Bypass
C30	680			GP680M	GP2K-680		RF Bypass
C31	5000		V-5596	BPD-5	811-005	29C1	Filament Bypass
C32	5000		V-5596	BPD-5	811-005	29C1	RF Bypass
C33	50			CN50JN750	N750K-47	MS-45	Fixed Trimmer
C34	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C35	5000		V-5596	BPD-5	811-005	29C1	AGC Filter
C36	5000		V-5596	BPD-5	811-005	29C1	AGC Filter
C37	5000		V-5596	BPD-5	811-005	29C1	1st V. IF Screen Bypass
C38	5000		V-5596	BPD-5	811-005	29C1	1st V. IF Fil. Bypass
C39	5000		V-5596	BPD-5	811-005	29C1	1st V. IF Plate Decoupling
C40	5000		V-5596	BPD-5	811-005	29C1	RF Bypass
C41	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C42	5000		V-5596	BPD-5	811-005	29C1	AGC Filter
C43	5000		V-5596	BPD-5	811-005	29C1	AGC Filter
C44	5000		V-5596	BPD-5	811-005	29C1	2nd V. IF Screen Bypass
C45	5000		V-5596	BPD-5	811-005	29C1	2nd V. IF Filament Bypass
C46	5000		V-5596	BPD-5	811-005	29C1	Filament Bypass
C47	5000		V-5596	BPD-5	811-005	29C1	2nd V. IF Decoupling
C48	82			CN82JN750	N750K-82		Fixed Trimmer

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA WESTINGHOUSE PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C49	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C50	5000		V-5596	BPD-5	811-005	29C1	3rd V. IF Screen Bypass
C51	5000		V-5596	BPD-5	811-005	29C1	3rd V. IF Fil. Bypass
C52	5000		V-5596	BPD-5	811-005	29C1	3rd V. IF Cath. Bypass
C53	5000		V-5596	BPD-5	811-005	29C1	3rd V. IF Decoupling
C54	82			CN82JN750	N750K-82		Fixed Trimmer
C55	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C56	5000		V-5596	BPD-5	811-005	29C1	4th V. IF Screen Bypass
C57	5000		V-5596	BPD-5	811-005	29C1	4th V. IF Cath. Bypass
C58	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C59	.001	600	V-6023-6102M	P688-001	GP2L-001	TM-21	AGC Filter
C60	22	500	RCM20B220M	1468-000025	GP1K-22	MS-425	AGC Filter
C61	.1	400	V-6023-4104M	P488-1		TM-1	AGC Filter
C62	.01	400	V-6023-4103M	P488-01	821-01	TM-11	AGC Coupling
C63	.01	400	V-6023-4103M	P488-01	821-01	TM-11	AGC Coupling
C64	.5	400	V-6066-4504M	484-5		TC-5	AGC Filter
C65	5		R2CC30CK050D	GP5K	NP0K-5	MS-55	V. Diode Filter
C66	10	500	RCM20B100M	1468-00001	GP1K-10	MS-41	V. Diode Filter
C67	.05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C68	.05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C69	.05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C70	470	500	RCM20B471M	1468-0005	GP2K-470	1FM-35	V. Output Cathode Bypass
C71	.05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C72	.05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C73	.1	400	V-6023-4104M	P488-1		TM-1	Pic. Tube Cathode Decoupling
C74	220	500	RCM20B221M	1469-0002	GP2K-220	MS-32	Fixed Trimmer
C75	5000		V-5596	BPD-5	811-005	29C1	1st S. IF Cathode Bypass
C76	1500		R5CC26ZY152M	GP1500M	GP2L-0015	1FM-215	1st S. IF Decoupling
C77	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	2nd S. IF Grid Filter
C78	1500		R5CC26ZY152M	GP1500M	GP2L-0015	1FM-215	2nd S. IF Decoupling
C79	1500		R5CC26ZY152M	GP1500M	GP2L-0015	1FM-215	2nd S. IF Decoupling
C80	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	Diode Load Cap.†
C81	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	Diode Load Cap. †
C82	5000		V-5596	BPD-5	811-005	29C1	RF Bypass
C83	.001	600	V-6023-6102M	P688-001	GP2L-001	TM-21	De-emphasis
C84	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C85	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C86	47		R2CC21ZY470K	GP47M	GP1K-47	1FM-45	AF Amp. Grid Bypass
C87	470	500	RCM20B471M	1468-0005	GP2K-470	1FM-35	AF Amp. Plate Bypass
C88	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Tone Compensation
C89	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C90	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	1st Sync. Amp. Plate Bypass
C91	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	Sync. Coupling
C92	.047	400	V-6023-4503M	P488-047		TM-15	Sync. Coupling
C93	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Sync. Coupling
C94	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Vert Sync. Coupling
C95A	2000		V-6060-1	1467-002	GP2M-002	1FM-22	Integrator Net.
B	5000			1467-005	811-005	1FM-25	Integrator Net.
C	5000			1467-005	811-005	1FM-25	Integrator Net.
C96	4700	500	RCM30B472J	1467-005	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C97	.068	400	V-6023-4683K	P488-068		TM-27	Vert. Discharge
C98	.25	400	V-6066-4254M	P488-25		TC-2	Vert. Sweep Coupling
C99	68	500	RCM20B680M	1468-000075	GP1K-68	1FM-475	Hor. Sync. Coupling
C100	.015	200	V-6023-2153K	P288-015			Fixed Trimmer
C101	.0047	400	V-6023-4472M	P688-0047	811-005	TM-25	AFC Filter
C102	.047	400	V-6023-4503M	P488-047		TM-15	AFC Filter
C103	.047	400	V-6023-4503M	P488-047		TM-15	Hor. AFC Screen Bypass
C104	.047	400	V-6023-4472M	P488-047		TM-15	Hor. AFC Coupling
C105	.015	200	V-6023-2153K	P288-015			Phase Shifter
C106	.0047	400	V-6023-4472M	P688-0047	GP2M-0047	TM-25	Hor. Osc. Grid Cap.
C107	.047	400	V-6023-4503M	P488-047		TM-15	Hor. Osc. Screen Bypass
C108	390	500	RCM20B391M	1468-0004	GP2K-390	1FM-34	Differentiator Net.
C109	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Hor. Sweep Coupling
C110	270	500	RCM20C271K	1468-00025	GP2K-270	1FM-325	Hor. Discharge
C111	.001	600	V-6023-6102M	P688-001	GP2L-001	TM-21	Hor. Sweep Coupling
C112	.1	400	V-6023-4104K	P488-1		TM-1	Damper Filter
C113	.15	400	V-6023-4154K	P488-15			Damper Filter
C114	.02	600	V-3782S-10W	P688-02		TM-12	Decoupling
C115	500	10000	V-8759				Voltage Divider
C116	500	10000	V-5895				HV Filter
C117	500	10000	V-5895				HV Filter
C118	.01	600	V-5050-15	P688-01	821-01	TM-11	Line Filter
C119	.01	600	V-5050-15	P688-01	821-01	TM-11	Line Filter
C120	.005	600	RCP10M6502A	P688-005	811-005	TM-25	Output Plate Bypass
C121	.01	400	V-6023-4103M	P488-01	821-01	TM-11	Tone Compensation
C122	5000		V-5596	BPD-5	811-005	29C1	Integrator Net. *
C123	5000		V-5596	BPD-5	811-005	29C1	Filament Bypass *
C124	5000		V-5596	BPD-5	811-005	29C1	4th V. IF Decoupling

* Not used in all models.
† When either item C80 or C81 are replaced, replace both with capacitors of equal value.
‡ Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2 Meg.	½	B13-139X *			Volume control, tapped @ 500KΩ, panel
B	1 Meg.	½	B11-137 *			Tone control, rear
C	Shaft End		V-6305	E202 *	V-6305	Attach per instructions in "Concentrikit".
D	Switch			76-1 *		Attach per instructions in "Concentrikit".
R2A	1 Meg.	½		B11-137 *		Vert. hold control, panel
B	50KΩ	½	V-6304	B11-123 *	V-6304	Horiz. hold control, rear
C	Shaft End			E202 *		Attach per instructions in "Concentrikit".
R3	50KΩ	½	V-6306	Q11-123	M-44-S	Brightness control
R4	2500Ω	½	V-6861			Contrast control
R5	25KΩ	½	V-5910	Q11-120	M-40-S	Horiz. linearity "A" control
R6	50Ω	2	V-5911	W-50	43-50	Horiz. centering control, Wire Wound
R7	50Ω	4	V-5913	W-50X25	43-50CT	Vert. centering control, tapped at 25Ω, Wire Wound
R8	2.5Meg.	½	V-5909	Q11-239	M-84-S	Height control
R9	3000Ω	½	V-5968	Q11-112	M-15-S	Vert. linearity control
R10	2000Ω	4	V-6513		10-2000	Focus control, Wire Wound
R11	5000Ω	½	V-5907	Q11-114	M-19-S	Sensitivity control

* Additional parts to be used with "Concentrikit".

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	IRC PART
R12	100KΩ 20%	½	RC20AE104M	BTS-100
R13	100KΩ 20%	½	RC20AE104M	BTS-100
R14	1000Ω 20%	½		BTS-100
R15	33KΩ 20%	½		
R16	10KΩ 20%	1		
R17	18KΩ	½		BTS-18K
R18	4700Ω	½		BTS-470
R19	82KΩ 20%	½		
R20	1 Meg. 20%	½		
R21	82KΩ	½		
R22	22KΩ 20%	½		
R23	470Ω 20%	½		
R24	6800Ω 20%	1		
R25	1000Ω 20%	1	RC30AE102M	BTA-100
R26	8200Ω	½	RC20AE822K	
R27	82Ω	½	RC20AE820K	
R28	2200Ω	½	RC20AE222K	BTS-220
R29	1000Ω 20%	½	RC20AE102M	BTS-100
R30	33KΩ 20%	½	RC20AE333M	BTS-33K
R31	10KΩ 20%	½	RC20AE103M	BTS-10K
R32	10KΩ 20%	½	RC20AE103M	BTS-10K
R33	8200Ω	½	RC20AE822K	
R34	82Ω	½	RC20AE820K	
R35	33KΩ 20%	½	RC20AE333M	BTS-33K
R36	1000Ω 20%	½	RC20AE102M	BTS-100
R37	6800Ω	½	RC20AE682K	BTS-680
R38	68Ω	½	RC20AE680K	
R39	33KΩ 20%	½	RC20AE333M	BTS-33K
R40	1000Ω 20%	½	RC20AE102M	BTS-100
R41	3900Ω	½	RC20AE392K	
R42	5600Ω	1	RC30AE562K	
R43	68Ω	½	RC20AE680K	
R44	33KΩ 20%	½	RC20AE333M	BTS-33K
R45	1000Ω 20%	½	RC20AE102M	BTS-100
R46	82KΩ	½	RC20AE823K	BTS-82K
R47	470KΩ 20%	½	RC20AE474M	BTS-470
R48	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R49	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R50	470KΩ 20%	½	RC20AE474M	BTS-470
R51	4700Ω 5%	2	RC40AE472J	BT-2-470
R52	470Ω	1	RC30AE471K	BTA-470
R53	470KΩ 20%	1	RC20AE474M	BTS-470
R54	470KΩ 20%	½	RC20AE474M	BTS-470
R55	220Ω	1	RC30AE221K	BW-1-220
R56	10KΩ	½	RC20AE103K	BTS-10K
R57	3300Ω	5	V-5924-1	
R58	22KΩ 20%	½	RC20AE223M	BTS-22K
R59	10KΩ 20%	½	RC20AE103M	BTS-10K
R60	470KΩ 20%	½	RC20AE474M	BTS-470
R61	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R62	4700Ω	½	RC20AE472K	BTS-4700
R63	68KΩ 20%	½	RC20AE683M	BTS-68K
R64	100KΩ 20%	½	RC20AE104M	BTS-100
R65	82KΩ	1	RC30AE823K	BTA-82K
R66	1000Ω 20%	½	RC20AE102M	BTS-1000
R67	220KΩ 20%	½	RC20AE224M	BTS-220
R68	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R69	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R70	68Ω	½	RC20AE680K	
R71	10KΩ	2	RC40AE103K	BT-2-10
R72	47KΩ 20%	½	RC20AE473M	BTS-47K
R73	47KΩ 20%	½	RC20AE473M	BTS-47K
R74	10KΩ 5%	½	RC20AE103J	BTS-10K
R75	10KΩ 5%	½	RC20AE103J	BTS-10K
R76	68KΩ 20%	½	RC20AE683M	BTS-68K
R77	47KΩ 20%	½	RC20AE473M	BTS-47K
R78	15 Meg. 20%	½	RC20AE156M	BTS-15 M
R79	220KΩ 20%	½	RC20AE224M	BTS-220
R80	470KΩ 20%	½	RC20AE474M	BTS-470
R81	270Ω	1	RC30AE271K	BW-1-270
R82	4700Ω	2	RC40AE472K	BT-2-470
R83	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R84	68KΩ	1	RC30AE683K	BTA-68K
R85	47KΩ 20%	½	RC20AE473M	BTS-47K
R86	100KΩ 20%	½	RC20AE104M	BTS-100
R87	10KΩ	2	RC40AE103K	BT-2-10
R88	4.7 Meg. 20%	½	RC20AE475M	BTS-4.7
R89	39KΩ	1	RC30AE393K	BTA-39K
R90	27KΩ	½	RC30AE273K	BTS-27K
R91	10KΩ	½	RC30AE103K	BTS-10K
R92	22KΩ 20%	½	RC20AE223M	BTS-22K
R93	8200Ω	½	RC20AE822K	BTS-8200
R94	8200Ω	½	RC20AE822K	BTS-8200
R95	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R96	6.8 Meg. 20%	½	RC20AE685M	BTS-6.8
R97	100KΩ 20%	½	RC20AE104M	BTS-100K
R98	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R99	68KΩ 20%	½	RC20AE683M	BTS-68K
R100	4700Ω	½	RC20AE472K	BTS-4700
R101	470Ω 20%	½	RC20AE471M	BTS-470
R102	2.2 Meg. 20%	½	RC20AE225M	BTS-2.2
R103	2200Ω	1	RC30AE222K	BTA-2200
R104	470KΩ 20%	½	RC20AE474M	BTS-470K
R105	1 Meg. 20%	½	RC20AE105M	BTS-1 Me
R106	470KΩ 20%	½	RC20AE474M	BTS-470K
R107	10Ω	1	RC30AE100K	BW-1-10
R108	470KΩ 20%	½	RC20AE474M	BTS-470K
R109	560Ω	½	RC20AE561K	BTS-560
R110	10Ω	½	RC20AE100K	
R111	47KΩ	1	RC30AE473K	BTA-47K
R112	39KΩ	1	RC30AE393K	BTA-39K
R113	39KΩ	1	RC30AE393K	BTA-39K
R114	27KΩ	1	RC30AE273K	BTA-27K
R115	27KΩ	½	RC20AE273K	BTS-27K

TV PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA WESTINGHOUSE PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C49	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C50	5000		V-5596	BPD-5	81L-005	29C1	3rd V. IF Screen Bypass
C51	5000		V-5596	BPD-5	81L-005	29C1	3rd V. IF Fil. Bypass
C52	5000		V-5596	BPD-5	81L-005	29C1	3rd V. IF Cath. Bypass
C53	5000		V-5596	BPD-5	81L-005	29C1	3rd V. IF Decoupling
C54	82			CN82JN750	N750K-82		Fixed Trimmer
C55	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C56	5000		V-5596	BPD-5	81L-005	29C1	4th V. IF Screen Bypass
C57	5000		V-5596	BPD-5	81L-005	29C1	4th V. IF Cath. Bypass
C58	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	IF Coupling
C59	001	600	V-6023-6103M	P688-001	GP2L-001	TM-31	AGC Filter
C60	22	500	RCM20B220M	1468-000025	GP1K-22	MS-425	AGC Filter
C61	1	400	V-6023-4104M	P488-1		TM-1	AGC Filter
C62	01	400	V-6023-4103M	P488-01	821-01	TM-11	AGC Coupling
C63	01	400	V-6023-4103M	P488-01	821-01	TM-11	AGC Coupling
C64	5	400	V-6066-4504M	484-5		TC-5	AGC Filter
C65	5		R2CC30CK050D	GP5K	NP0K-5	MS-55	V. Diode Filter
C66	10	500	RCM20B100M	1468-00001	GP1K-10	MS-41	V. Diode Filter
C67	05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C68	05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C69	05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C70	470	500	RCM20B471M	1468-0005	GP2K-470	1FM-35	V. Output Cathode Bypass
C71	05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C72	05	400	V-6023-4503M	P488-05		TM-15	Video Coupling
C73	1	400	V-6023-4104M	P488-1		TM-1	Pic. Tube Cathode Decoupling
C74	220	500	RCM20B221M	1469-0002	GP2K-220	MS-32	Fixed Trimmer
C75	5000		V-5596	BPD-5	81L-005	29C1	1st S. IF Cathode Bypass
C76	1500		R5CC262Y152M	GP1500M	GP2L-0015	1FM-215	1st S. IF Decoupling
C77	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	2nd S. IF Grid Filter
C78	1500		R5CC262Y152M	GP1500M	GP2L-0015	1FM-215	2nd S. IF Decoupling
C79	1500		R5CC262Y153M	GP1500M	GP2L-0015	1FM-215	2nd S. IF Decoupling
C80	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	Diode Load Cap.†
C81	47	500	RCM20B470K	1468-00005	GP1K-47	1FM-45	Diode Load Cap. †
C82	5000		V-5596	BPD-5	81L-005	29C1	RF Bypass
C83	001	600	V-6023-6102M	P688-001	GP2L-001	TM-31	De-emphasis
C84	01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C85	01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C86	47		R2CC21ZY470K	GP47M	GP1K-47	1FM-45	AF Amp. Grid Bypass
C87	470	500	RCM20B471M	1468-0005	GP2K-470	1FM-35	AF Amp. Plate Bypass
C88	01	400	V-6023-4103M	P488-01	821-01	TM-11	Tone Compensation
C89	01	400	V-6023-4103M	P488-01	821-01	TM-11	Audio Coupling
C90	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	1st Sync. Amp. Plate Bypass
C91	270	500	RCM20B271M	1468-00025	GP2K-270	1FM-325	Sync. Coupling
C92	047	400	V-6023-4503M	P488-047		TM-15	Sync. Coupling
C93	01	400	V-6023-4103M	P488-01	821-01	TM-11	Sync. Coupling
C94	01	400	V-6023-4103M	P488-01	821-01	TM-11	Vert. Sync. Coupling
C95A	2000		V-6060-1	1467-002	GP2M-002	1FM-22	Integrator Net.
B	5000			1467-005	811-005	1FM-25	Integrator Net.
C	500			1467-005	811-005	1FM-25	Integrator Net.
C98	4700	500	RCM30B472J	1467-005	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C97	068	400	V-6023-4683K	P488-068		TM-27	Vert. Discharge
C98	25	400	V-6023-4250M	P488-25		TC-2	Vert. Sweep Coupling
C99	68	500	RCM20B680M	1468-000075	GP1K-68	1FM-475	Hor. Sync. Coupling
C100	015	200	V-6023-2153K	P288-015			Fixed Trimmer
C101	.0047	400	V-6023-4472M	P488-0047	811-005	TM-25	AFC Filter
C102	047	400	V-6023-4503M	P488-047		TM-15	AFC Filter
C103	047	400	V-6023-4503M	P488-047		TM-15	Hor. AFC Screen Bypass
C104	047	400	V-6023-4473M	P488-047		TM-15	Hor. AFC Coupling
C105	015	200	V-6023-2153K	P288-015			Phase Shifter
C106	.0047	400	V-6023-4472M	P488-0047	GP2M-0047	TM-25	Hor. Osc. Grid Cap.
C107	047	400	V-6023-4503M	P488-047		TM-15	Hor. Osc. Screen Bypass
C108	390	500	RCM20B391M	1468-0004	GP2K-390	1FM-34	Differentiator Net.
C109	01	400	V-6023-4103M	P488-01	821-01	TM-11	Hor. Sweep Coupling
C110	270	500	RCM20C271K	1468-00025	GP2K-270	1FM-325	Hor. Discharge
C111	001	600	V-6023-6102M	P688-001	GP2L-001	TM-31	Hor. Sweep Coupling
C112	1	400	V-6023-4104M	P488-1		TM-1	Hor. Sweep Coupling
C113	15	400	V-6023-4154K	P488-15			Damper Filter
C114	02	600	V-3782S-10W	P688-02		TM-12	Decoupling
C115	500	10000	V-5895				Voltage Divider
C116	500	10000	V-5895				HV Filter
C117	500	10000	V-5895				HV Filter
C118	01	600	V-5050-15	P688-01	821-01	TM-11	Line Filter
C119	01	600	V-5050-15	P688-01	821-01	TM-11	Line Filter
C120	005	600	RCP10M6502A	P688-005	811-005	TM-25	Output Plate Bypass
C121	01	400	V-6023-4103M	P488-01	821-01	TM-11	Tone Compensation
C122	5000		V-5596	BPD-5	811-005	29C1	Integrator Net. *
C123	5000		V-5596	BPD-5	811-005	29C1	Filament Bypass *
C124	5000		V-5596	BPD-5	811-005	29C1	4th V. IF Decoupling

* Not used in all models.
† When either item C80 or C81 are replaced, replace both with capacitors of equal value.
‡ Parallel sectioned to obtain desired capacity.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2 Meg			B13-139X *		Volume control, tapped @ 500KΩ, panel
B	1 Meg.			B11-137 *		Tone control, rear
C	Shaft End		V-6305	K202 *	V-6305	Attach per instructions in "Concentrikit".
D	Switch			78-1 *		Attach per instructions in "Concentrikit".
R2A	1 Meg.			B11-137 *		Vert. hold control, panel
B	50KΩ		V-6304	B11-123 *	V-6304	Horiz. hold control, rear
C	Shaft End			K202 *		Attach per instructions in "Concentrikit".
R3	50KΩ		V-6306	Q11-123	M-44-8	Brightness control
R4	2500Ω		V-6861			Contrast control
R5	25KΩ		V-5810	Q11-120	M-40-8	Horiz. linearity "A" control
R6	50Ω	2	V-5911	W-50	43-50	Horiz. centering control, Wire Wound
R7	50Ω	4	V-5913	W-50X25	43-50CT	Vert. centering control, tapped at 25Ω, Wire Wound
R8	2.5Meg.	1	V-5909	Q11-239	M-84-8	Height control
R9	3000Ω	2	V-5998	Q11-112	M-15-8	Vert. linearity control
R10	2000Ω	6	V-6503		10-2000	Focus control, Wire Wound
R11	5000Ω	2	V-3907	Q11-114	M-19-8	Sensitivity control

* Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED
R12	100KΩ 20%	1	RC20AE104M	BTS-100K	Ant. Shunt
R13	100KΩ 20%	1	RC20AE104M	BTS-100K	Ant. Shunt
R14	1000Ω 20%	1		BTS-1000	RF Grid
R15	33KΩ 20%	1			RF Screen
R16	10KΩ 20%	1			RF Plate
R17	18KΩ	1		BTS-18K	RF Plate Coil Shunt
R18	4700Ω	1		BTS-4700	Mixer Grid Coil Shunt
R19	82KΩ 20%	1			Mixer Grid
R20	1 Meg. 20%	1			Mixer Grid
R21	82KΩ	1			Mixer Screen
R22	22KΩ 20%	1			Osc. Grid
R23	470Ω 20%	1			Osc. Cathode
R24	68000Ω 20%	1			Osc. Plate
R25	1000Ω 20%	1	RC30AE102M	BTA-1000	Decoupling
R26	820Ω	1	RC20AE822K		1st Video IF Grid
R27	820	1	RC20AE820K		1st Video IF Cathode
R28	2200Ω	1	RC20AE222K	BTS-2200	1st Video IF Plate
R29	1000Ω 20%	1	RC20AE102M	BTS-1000	1st Video IF Plate Decoupling
R30	33KΩ 20%	1	RC20AE333M	BTS-33K	1st Video IF Screen
R31	10KΩ 20%	1	RC20AE103M	BTS-10K	AGC Network
R32	10KΩ 20%	1	RC20AE103M	BTS-10K	AGC Network
R33	8200Ω	1	RC20AE822K		2nd Video IF Grid
R34	820Ω	1	RC20AE820K		2nd Video IF Cathode
R35	33KΩ 20%	1	RC20AE333M	BTS-33K	2nd Video IF Screen
R36	1000Ω 20%	1	RC20AE102M	BTS-1000	2nd Video IF Decoupling
R37	6800Ω	1	RC20AE682K	BTS-6800	3rd Video IF Grid
R38	68Ω	1	RC20AE680K		3rd Video IF Cathode
R39	33KΩ 20%	1	RC20AE333M	BTS-33K	3rd Video IF Screen
R40	1000Ω 20%	1	RC20AE102M	BTS-1000	3rd Video IF Decoupling
R41	3900Ω	1	RC20AE392K		4th Video IF Grid
R42	5600Ω	1	RC20AE562K		4th Video IF Plate
R43	68Ω	1	RC20AE680K		4th Video IF Cathode
R44	33KΩ 20%	1	RC20AE333M	BTS-33K	4th Video IF Screen
R45	1000Ω 20%	1	RC20AE102M	BTS-1000	4th Video IF Decoupling
R46	82KΩ	1	RC20AE823K	BTS-82K	AGC Rect. Diode Load
R47	470KΩ 20%	1	RC20AE474M	BTS-470K	AGC Filter Network
R48	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	AGC Amp. Grid
R49	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	AGC Amp. Grid
R50	470KΩ 20%	2	RC20AE474M	BTS-470K	Video Amp. Grid
R51	47000Ω 5%	2	RC40AE4752	BT-2-4700-5%	Video Amp. Plate
R52	4700	1	RC30AE471K	BTA-470	Video Amp. Plate Decoupling
R53	470KΩ 20%	1	RC20AE474M	BTS-470K	Noise Clipper Load
R54	470KΩ 20%	1	RC20AE474M	BTS-470K	Video Output Grid
R55	2200	1	RC30AE221K	BW-1-220	Video Output Cathode
R56	10KΩ	1	RC20AE103K	BTS-10K	Peaking Coil Shunt
R57	3300Ω	1		V-5924-1	Video Output Plate-Wire Wound
R58	22KΩ 20%	1	RC20AE223M	BTS-22K	Video Output Screen
R59	10KΩ 20%	1	RC20AE103M	BTS-10K	Isolation
R60	470KΩ 20%	1	RC20AE474M	BTS-470K	Picture Tube Grid
R61	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	DC Rest. Load
R62	47000	1	RC20AE472K	BTS-4700	1st Sync. Amp. Grid-See Note 4
R63	68KΩ 20%	1	RC20AE683M	BTS-68K	Voltage Divider
R64	100KΩ 20%	1	RC20AE104M	BTS-100K	Voltage Divider -See Note 3
R65	82KΩ	1	RC30AE823K	BTA-82K	Voltage Divider
R66	1000Ω 20%	1	RC20AE102M	BTS-1000	AGC Amp. Cathode
R67	220KΩ 20%	1	RC20AE224M	BTS-220K	AGC Amp. Plate
R68	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	AGC Network
R69	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	AGC Network
R70	68Ω	1	RC20AE680K		1st Sound I.F Cathode
R71	10KΩ	2	RC40AE103K	BT-2-10K	1st Sound I.F Decoupling
R72	47KΩ 20%	1	RC20AE473M	BTS-47K	2nd Sound I.F Grid
R73	47KΩ 20%	1	RC20AE473M	BTS-47K	2nd Sound I.F Decoupling
R74	10KΩ 5%	1	RC20AE103J	BTS-10K-5%	Ratio Det. Diode Load
R75	10KΩ 5%	1	RC20AE103J	BTS-10K-5%	Ratio Det. Diode Load
R76	68KΩ 20%	1	RC20AE683M	BTS-68K	De-emphasis
R77	47KΩ 20%	1	RC20AE473M	BTS-47K	Tone Compensation
R78	15 Meg. 20%	1	RC20AE156M	BTS-15 Meg.	AF Grid
R79	220KΩ 20%	1	RC20AE224M	BTS-220K	AF Plate
R80	470KΩ 20%	1	RC20AE474M	BTS-470K	Output Grid
R81	270Ω	1	RC30AE271K	BW-1-270	Output Cathode
R82	4700Ω	2	RC40AE472K	BT-2-4700	1st Sync. Amp. Plate-See Note 1
R83	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	Sync. Sep. Grid
R84	68KΩ	1	RC20AE683K	BTA-68K	Sync. Sep. Plate
R85	47KΩ 20%	1	RC20AE473M	BTS-47K	Voltage Divider
R86	100KΩ 20%	2	RC30AE104M	BTS-100K	2nd Sync. Amp. Grid
R87	10KΩ	2	RC40AE103K	BT-2-10K	2nd Sync. Amp. Plate
R88	4.7 Meg. 20%	1	RC20AE475M	BTS-4.7 Meg.	2nd Sync. Amp. Grid
R89	39KΩ	1	RC30AE393K	BTA-39K	2nd Sync. Amp. Plate
R90	27KΩ	1	RC30AE273K	BTS-27K	Voltage Divider
R91	10KΩ	1	RC30AE103K	BTS-10K	Voltage Divider
R92	22KΩ 20%	1	RC20AE223M	BTS-22K	Integrator
R93	8200Ω	1	RC20AE822K	BTS-8200	Integrator
R94	82000Ω	1	RC20AE823K	BTS-8200	Integrator
R95	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	Vert. Osc. Grid
R96	6.8 Meg. 20%	1	RC20AE685M	BTS-6.8 Meg.	Voltage Divider
R97	100KΩ 20%	1	RC20AE104M	BTS-100K	Voltage Divider
R98	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	Vert. Osc. Plate-See Note 5
R99	68KΩ 20%	1	RC20AE683M	BTS-68K	Vert. Osc. Decoupling
R100	47000Ω	1	RC20AE472K	BTS-4700	Vert. Peaking-See Note 2
R101	470Ω 20%	1	RC20AE471M	BTS-470	Vert. Output Cathode
R102	2.2 Meg. 20%	1	RC20AE225M	BTS-2.2 Meg.	Vert. Output Grid
R103	2200Ω	1	RC30AE222K	BTA-2200	Vert. Output Decoupling
R104	470KΩ 20%	2	RC20AE474M	BTS-470K	Horiz. Sync. Disc. Load
R105	1 Meg. 20%	1	RC20AE105M	BTS-1 Meg.	Horiz. Sync. Disc. Load
R106	470KΩ 20%	2	RC20AE474M	BTS-470K	Horiz. Sync. Disc. Load
R107	10Ω	1	RC30AE100K	BW-1-10	Bias Network
R108	470KΩ 20%	1	RC20AE474M	BTS-470K	Horiz. AFC Filter Network
R109	560Ω	1	RC20AE561K	BTS-560	Horiz. AFC Grid
R110	10Ω	1	RC20AE100K		Horiz. AFC Cathode
R111	47KΩ	1	RC30AE473K	BTA-47K	Horiz. AFC Plate
R112	39KΩ	1	RC30AE393K	BTA-39K	Horiz. AFC Plate
R113	39KΩ	1	RC30AE393K	BTA-39K	Horiz. AFC Screen
R114	27KΩ	1	RC30AE273K	BTA-27K	Voltage Divider
R115	27KΩ	1	RC20AE273K	BTS-27K	Horiz. Osc. Grid

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	IRC PART No.	IDENTIFICATION CODES
R116	5000Ω	5	V-5925	AB-5000	Horiz. Osc. Plate-Wire Wound
R117	10KΩ 20%	1	RC30AE103M	BTS-10K	Horiz. Osc. Screen
R118	68000Ω 20%	1	RC20AE682M	BTS-6800	Differentiator
R119	560Ω	1	RC20AE561K	BTS-560	Differentiator
R120	220KΩ 20%	1	RC20AE224M	BTS-220K	Horiz. Discharge Grid
R121	3900Ω	1	RC20AE392K	BTS-3900	Horiz. Peaking
R122	150KΩ	1	RC20AE154K	BTS-150K	Horiz. Discharge Plate
R123	68KΩ 20%	1	RC20AE683M	BTS-68K	Voltage Divider
R124	220KΩ 20%	2	RC20AE224M	BTS-220K	Feedback
R125	220KΩ 20%	2	RC20AE224M	BTS-220K	Horiz. Output Grid
R126	100Ω 20%	2	RC40AE101M	BW-2-100	Horiz. Output Cathode
R127	100Ω 20%	1	RC20AE101M		Parasitic Supp.
R128	100Ω 20%	1	RC20AE101M		Parasitic Supp.
R129	100Ω 20%	1	RC20AE101M		Parasitic Supp.
R130	100Ω 20%	1	RC20AE101M		Parasitic Supp.
R131	470Ω 20%	1	RC20AE470M		Parasitic Supp.
R132	470Ω 20%	1	RC20AE470M		Parasitic Supp.
R133	82KΩ	1	RC30AE823K	BTA-82K	Horiz. Output Screen
R134	39KΩ	2	RC40AE393K	BT-2-39K	Horiz. Output Screen
R135	510KΩ	1	RC30AE514K		HV Rect. Load
R136	510KΩ	1	RC30AE514K		HV Rect. Load
R137	510KΩ	1	RC30AE514K		HV Rect. Load
R138	510KΩ	1	RC30AE514K		HV Rect. Load
R139	250Ω	20	V-5922	DG-250	Bias Network-Wire Wound
R140	1000 20%	2	RC40AE101M	BW-2-100	Focus Coil Shunt
R141	8200Ω	1	RC20AE822K		1st Video IF Coil Shunt

Note 1. Some models use 10KΩ, 2 watt resistor in this application.
Note 2. Some models use 3300Ω resistor in this application.
Note 3. Not used in all models.
Note 4. Some models use 47KΩ resistor in this application.
Note 5. Some models use 1.5 Meg. resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	PRI. 117VAC @ 3.8A SEC. 1 700VCT 190MA @ 3A SEC. 2 5VAC @ 2A SEC. 3 5VAC @ 2A SEC. 4 12.6VCT @ 1A SEC. 5 6.3VAC @ .45A	V-5936			
T2	117VAC @ .16A 590VCT 049ADC @ 2A 5VAC 6.3VAC @ .45A	V-6505	P-6119 ③	P-2951 ③	PH-70 ③

③ Drill new mounting holes.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE	WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T3	190Ω 130Ω	V-5937	A-8121	A-4000	TBO-1	Vert. Block Osc. Trans.
T4	1700 Tap SEC. 1 @ 78Ω 4.2Ω Tap @ .3Ω SEC. 2 0Ω SEC. 3 0Ω	V-6213	A-8119	BVO-5	TFB-4	Hor. Output Trans.
T5	610Ω 9.3Ω	V-5938	A-8115 ③	A-3035 ③	TSO-1 ③	Vert. Output Trans.
T6A	14Ω	V-6073	DY-1			Hor. Deflection Coil
B	98Ω					Vert. Deflection Coil
T7	240Ω	V-5900-1	FC-10			Focus Coil

③ Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	5KΩ	3.4Ω	400Ω	4Ω	V-5798	A-3849	A-2902	RO-9 ②	② Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS FIELD RES.	V. C. IMP.	WESTINGHOUSE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	PM	3.4Ω	V-6873	ST-119 ① MOD. P10-T	10A3I	① Replace output transformer to match 6-8Ω voice coil.
SP2	CONE DIA. 9 1/8"	V. C. DIA. 3/4"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.170A	220Ω	6 Henries	V-6515	C-2325 ②	C-2991 ②	TR-4200 ②	② Drill one new mounting hole.
L2	.155A	104Ω	2.4 Henries	V-6516	C-2303	C-2974	TR-4200 ②	
L3	.049A	225Ω	6 Henries	V-6504	C-1325	C-2977	R-650	

TV **PARTS LIST AND DESCRIPTIONS (Continued)**

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L4	Ant. Trans.	0Ω				Part of tuner.
L5	Fil. Choke	0Ω				Part of tuner.
L6	Fil. Choke	0Ω				Part of tuner.
L7	Fil. Choke	0Ω				
L8	1st Video IF	.2Ω		V-5905-1		
L9	Fil. Choke	1Ω		V-4886-1		
L10	2nd Video IF	.2Ω		V-5903-2		
L11	Fil. Choke	1Ω		V-4886-1		
L12	3rd Video IF	.2Ω		V-5905-2		
L13	Fil. Choke	1Ω		V-4886-1		
L14	4th Video IF	.2Ω		V-5905-3		
L15	Fil. Choke	1Ω		V-4886-1		
L16	Sound Trap	.1Ω	0Ω	V-5899		
L17	5th Video IF	.2Ω		V-5903-2		
L18	Peaking	5Ω		V-5902-2		
L19	Peaking	5.5Ω		V-5902-1		
L20	Peaking	5Ω		V-5902-2		
L21	Peaking	5Ω		V-5902-2		
L22	Peaking	5.5Ω		V-5902-1		
L23	1st Sound IF	.2Ω		V-5932		
L24	2nd Sound IF	.2Ω	.2Ω	V-5933		
L25	Ratio Det. Trans.	.3Ω	.1Ω	V-5939		
L26	RF Choke	1Ω		V-4886-1		
L27	Hor. Sync. Disc. Trans.	40Ω	35Ω	V-5935		
L28	Width Cont.	.5Ω		V-6207		
L29	Hor. Linearity	8Ω		V-6206		

MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
M1A	RF Tuner	V-8200	
B	RF Tuner	V-9124	
M2	Ion Trap		
M3	Fuse		.25A, 250V
M4	Crystal		DC Restorer, Sylvania 1N34
	Cabinet	V-1169-10	Model H-217B
	Channel Indicator	V-6889-1	
	Safety Glass	V-6163-2	Model H-217B
	Knob	V-6146-1	On-Off Tone (Radio), On-Off Tone, Hor. Hold (TV)
	Knob	V-6146-2	Band Switch (Radio)
	Knob	V-6147-1	Volume, (Radio), Volume, Vert. Hold (TV)
	Knob	V-6147-2	Tuning (Radio)
	Knob	V-6245-1	Brightness, Contrast-Rear (TV)
	Knob	V-6146-5	Brightness, Contrast-Front (TV)
	Knob	V-7892	Fine Tuning (TV)
	Knob	V-7893	Channel Selector (TV)

RADIO **PARTS LIST AND DESCRIPTIONS**

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V32	FM RF Amp. - Mixer	12AT7	12AT7	9A	
V33	AM Conv. -FM Osc.	6BE6	6BE6	7CH	
V34	1st IF Amp.	6BA6	6BA6	7BK	
V35	FM 2nd IF Amp.	6BA6	6BA6	7BK	
V36	Ratio Det.	6AL5	6AL5	6BT	
V37	DET. -AVC-AF	6AV6	6AV6	7BT	
V38	Power Output	6V6GT	6V6GT	7AC	
V39	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Westinghouse PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C125A	20	400	V-6121	AF444J4A		EL-442	● Filter
B	20	400					■ Filter
C	10	350					▲ Decoupling
D	20	25					Output Cathode Bypass
C126	4	150	V-6638	PRS150/4		UT-41	Stabilizing Cap.
C127	100		R3CC30SL101M	GP100M	GP1K-100	1FM-31	RF Coupling
C128	5000		V-5596	BPD-5	811-005	29C1	FM RF Cathode Bypass
C129	5000		V-5596	BPD-5	811-005	29C1	RF Grid Filter
C130	470		R5CC21ZY471M	GP470M	GP2K-470	1FM-35	RF Grid Filter
C131	33		R3CC26CK330M	GP33M	GP1K-33	1FM-44	RF Coupling
C132	33		R3CC26CK330M	GP33M	GP1K-33	1FM-44	RF Coupling
C133	2		R2CC30CK020D	CN2CN750	N750K-2		Osc. Coupling
C134	5000		V-5596	BPD-5	811-005	29C1	FM RF Plate Decoupling
C135	100		R3CC30SL101J	CN100JN750	N750L-100	MS-31	Fixed Trimmer
C136	5000		V-5596	BPD-5	811-005	29C1	FM Mixer Plate Decoupling
C137	470		R5CC21ZY471M	GP470M	GP2K-470	1FM-35	RF Coupling
C138	.02	200	RCP10W2203A	P488-02		TM-12	AVC Filter
C139	470		R5CC21ZY471M	GP470M	GP2K-470	1FM-35	Osc. Anode Bypass
C140	27		R3CC30CK270K	GP27K	GP1K-27	MS-425	Osc. Grid Cap.
C141	5		R2CC30CK050D	CN5DNPO	NPOK-5	MS-55	Osc. Feedback
C142	2		R2CC30UK020D	CN2CN750	N750K-2		Fixed Trimmer
C143	5000		V-5596	BPD-5	811-005	29C1	AM Conv. Plate Decoupling
C144	5000		V-5596	BPD-5	811-005	29C1	AVC Filter

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA WESTINGHOUSE PART No.	AEROVOX PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C145	5000		V-5596	BPD-5	811-005	29C1	Conv. Filament Bypass
C146	5000		V-5596	BPD-5	811-005	29C1	1st IF Cathode Bypass
C147	5000		V-5596	BPD-5	811-005	29C1	1st IF Screen Bypass
C148	5000		V-5596	BPD-5	811-005	29C1	1st IF Plate Decoupling
C149	100	500	RCM20A101M	1468-0001	GP1K-100	1FM-31	Diode RF Filter
C150	100	500	RCM20A101M	1468-0001	GP1K-100	1FM-31	Diode RF Filter
C151	5000		V-5596	BPD-5	811-005	29C1	2nd IF Cathode Bypass
C152	5000		V-5596	BPD-5	811-005	29C1	2nd IF Screen Bypass
C153	5000		V-5596	BPD-5	811-005	29C1	2nd IF Plate Decoupling
C154	150	500	RCM20A151J	1468-00015	GP2K-150	1FM-315	Diode Load Cap. †
C155	150	500	RCM20A151J	1468-00015	GP2K-150	1FM-315	Diode Load Cap. †
C156	.002	600	RCP10W6202A	P688-002	GP2M-002	TM-22	De-emphasis
C157	.01	400	V-5040-13	P488-01	821-01	TM-11	DAVC Decoupling *
C158	.01	400	RCP10W4103A	P488-01	821-01	TM-11	Audio Coupling
C159	.01	200	V-5040-13	P488-01	821-01	TM-11	Filament Bypass
C160	470	500	RCM20A471M	1468-0005	GP2K-470	1FM-35	Tone Compensation
C161	.05	200	RCP10W2503A	P288-05		TM-15	Tone Compensation
C162	.01	400	RCP10W4103A	P488-01	821-01	TM-11	Audio Coupling
C163	150	500	RCM20A151M	1468-00015	GP2K-150	1FM-315	AF Amp. Plate Bypass
C164	.03	400	RCP10W4303A	P488-03		TM-13	AF Amp. Plate Decoupling
C165	.01	400	RCP10W4103A	P488-01	821-01	TM-11	Audio Coupling
C166	680	500	RCM20A681M	1468-00075	GP2K-680	1FM-37	Tone Compensation
C167	.005	600	RCP10M6502A	P688-005	811-005	TM-25	Output Plate Bypass

* Not used in all models.
† When either item C154 or C155 are replaced, replace both with capacitors of equal value.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R142A	500KΩ	1/2	V-6122		V-6122	Volume control, tapped @ 250KΩ
B	2 Meg.	1/2				Tone control and switch

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	IRC PART No.	IDENTIFICATION CODES
R143	82Ω	1/2	RC10AE820K		FM RF Cathode
R144	470KΩ	1/2	RC10AE474M	BTS-470K	FM RF Grid
R145	15Ω	1/2	RC10AE150M		Parasitic Supp.
R146	470KΩ	1/2	RC10AE474M	BTS-470K	FM Mixer Grid
R147	2.2 Meg.	1/2	RC10AE225M	BTS-2.2 Meg.	AVC Network
R148	5600Ω	1	RC30AE562K	BTA-5600	FM RF Plate Decoupling
R149	1000Ω	1/2	RC10AE102K	BTS-1000	FM Mixer Plate Decoupling
R150	2200Ω	1/2	RC10AE222K	BTS-2200	Ant. Loading
R151	22KΩ	1/2	RC10AE223K	BTS-22K	Osc. Grid
R152	1 Meg.	1/2	RC10AE105M	BTS-1 Meg.	AVC Network
R153	33Ω	1/2	RC10AE330K		Parasitic Supp.
R154	1 Meg.	1/2	RC10AE105M	BTS-1 Meg.	AVC Network
R155	12KΩ	2	RC40AE123K	BT-2-12K	AM Conv. Screen -See Note 6
R156	4700Ω	1/2	RC10AE472K	BTS-4700	AM Conv. Plate Decoupling
R157	470KΩ	1/2	RC10AE474M	BTS-470K	AVC Network
R158	68Ω	1/2	RC10AE680K		1st IF Cathode
R159	33KΩ	1	RC30AE333K	BTA-33K	1st IF Screen
R160	3300Ω	1	RC30AE332K	BTA-3300	1st IF Plate Decoupling
R161	47KΩ	1/2	RC30AE473M	BTS-47K	Diode Filter
R162	2.2 Meg.	1/2	RC30AE225M	BTS-2.2 Meg.	Diode Load
R163	68Ω	1/2	RC30AE680K		FM 2nd IF Cathode
R164	33KΩ	1	RC30AE333K	BTA-33K	FM 2nd IF Screen
R165	3300Ω	1	RC30AE332K	BTA-3300	FM 2nd IF Plate Decoupling
R166	220Ω	1/2	RC10AE221M	BW-1/2-220	Balancing
R167	47KΩ	1/2	RC10AE473M	BTS-47K	De-emphasis
R168	15KΩ	1/2	RC10AE153K	BTS-15K	Ratio Det. Diode Load
R169	220KΩ	1/2	RC10AE224M	BTS-220K	AVC Network
R170	3.3 Meg.	1/2	RC10AE335M	BTS-3.3 Meg.	Delayed AVC
R171	1500Ω	1/2	RC10AE152M	BTS-1500	Tone Compensation
R172	10 Meg.	1/2	RC10AE106M	BTS-10 Meg.	AF Grid
R173	470KΩ	1/2	RC10AE474M	BTS-470K	AF Plate
R174	150KΩ	1/2	RC10AE154M	BTS-150K	AF Plate Decoupling
R175	470KΩ	1/2	RC10AE474M	BTS-470K	Output Grid
R176	270Ω	1	RC30AE271K	BW-1-270	Output Cathode

Note 6. Some models use 3 resistors in parallel to obtain required resistance and wattage.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T9	117VAC	640VCT	5VAC	6.3VAC	V-6131	P-6013 ④ ⑤	P-2952 ④ ⑤	PV-100 ⑤
	② .73A	.105ADC	② 2A	② 2.7A				

④ Mount vertically with universal mounting brackets.
⑤ Add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T10	5KΩ	3.4Ω	400Ω	.4Ω	V-5798	A-3849	A-2902	RO-9 ②	② Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA WESTINGHOUSE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP3	PM	3.4Ω	V-6673	ST-119 ① MOD. P10-T	10A31	① Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	V. C. DIA.				
SP4	9 1/2"	3/4"				

RADIO **PARTS LIST AND DESCRIPTIONS (Continued)**

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	WESTINGHOUSE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L30	.105A	230Ω	5.5 Henries	V-6161		C-2977	R-885	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	WESTINGHOUSE PART No.	MEISSNER PART No.	
L31	AM Loop Ant.	0Ω		V-5982-2		
L32	Loop Loading	.2Ω		V-6157		
L33	FM Dipole	0Ω		V-5986-3		
L34	RF Choke	0Ω		V-4886-10		Wound on resistor.
L35	FM Ant. Coil	0Ω		V-6139		
L36	FM Osc. Coil	0Ω		V-6138		
L37	AM Osc. Coil	9Ω		V-6164		
L38	RF Choke	0Ω		V-4886-7		Wound on 22Ω resistor.
L39	RF Choke	1.5Ω		V-4886-4		
L40	RF Choke	0Ω		V-4886-6		Wound on 820Ω resistor.
L41	RF Choke	.5Ω		V-4886-2		
L42	FM 1st IF	.5Ω	.5Ω	V-6142		
L43	AM 1st IF	16Ω	16Ω	V-6130	16-6678	
L44	FM 2nd IF	.5Ω	.5Ω	V-6129		
L45	AM 2nd IF	16Ω	16Ω	V-6130	16-6678	
L46	Ratio Det. Trans.	1Ω	0Ω	V-6128		
L47	Fil. Choke	1Ω		V-4886-1		
L48	Fil. Choke	.5Ω		V-4886-2		
L49	Fil. Choke	.5Ω		V-4886-2		

DIAL LIGHTS

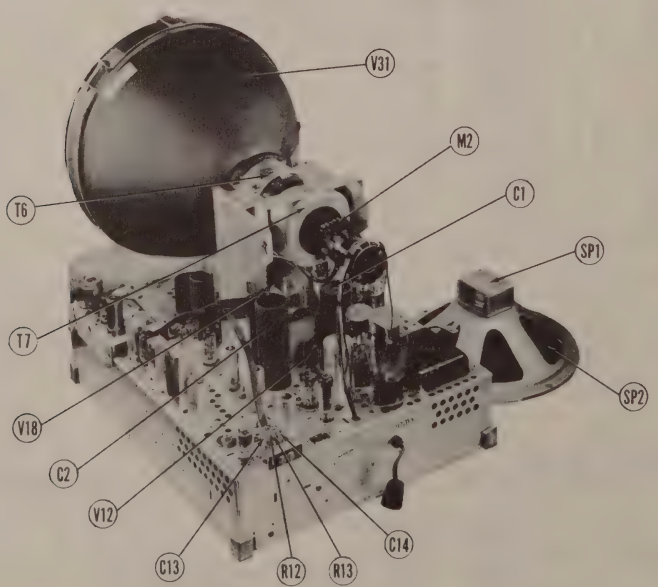
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					WESTINGHOUSE PART No.		
M5	Bayonet	6-8	.15	Brown	47		Type #47
M6	Bayonet	6-8	.15	Brown	47		Type #47

PHONO CARTRIDGE and NEEDLE

ITEM No.	REPLACEMENT DATA					REMARKS
	Westinghouse PART No.	ASTATIC PART No.		SHURE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M7		ACD-J	C-1 (J) and C-3 (J)			

MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
M8	Switch	V-6140	Band
M9	Tuning Cap.	V-6137	(48-522MMF, 37-212MMF) W/T
	Dial	V-6123	
	Dial Pointer	V-6125	



CHASSIS-TOP VIEW

SENSITIVITY CONTROL ADJUSTMENTS

For average conditions, this control may be set as follows:

1. Disconnect antenna from receiver.
2. Connect VTVM from AGC line to chassis.
3. Turn sensitivity control fully clockwise.
4. Now slowly turn the control counter-clockwise until VTVM reading decreases to 0.6 volt.
5. If voltage will not decrease to 0.6 volt turn control to the point where the voltage stops decreasing.

Another method of adjustment is as follows:

1. Disconnect antenna from receiver.
2. Turn contrast control fully clockwise.
3. Turn brightness control just to the point where the raster appears.
4. Turn the sensitivity control fully counter-clockwise and notice the black noise dots which appear on the raster.
5. Slowly turn the sensitivity control clockwise to the point when the noise dots disappear.
6. Back up the control to point where the noise dots reappear.

The two methods outlined above are for average conditions. For extremely weak or strong signals this control should be adjusted for best picture quality on all available stations.

HORIZONTAL OSCILLATOR ALIGNMENT

Turn the set on and tune in a TV station. Turn the vertical hold control to synchronize the picture vertically. Turn the horizontal hold control to the mid-position of its range.

Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. Adjust the phasing slug (B2) until the blanking bar, which may appear in the picture, moves to the right and off the raster.

HORIZONTAL LINEARITY ADJUSTMENT

Adjust the width slug (B3) until the picture is of proper size to fill the mask horizontally. Adjust the horizontal linearity slug (B4) and the horizontal linearity control until the picture is symmetrical from left to right. The horizontal linearity control effects mainly the right half of the picture, and B4 effects the center of the picture. These two adjustments should be made alternately for best results.

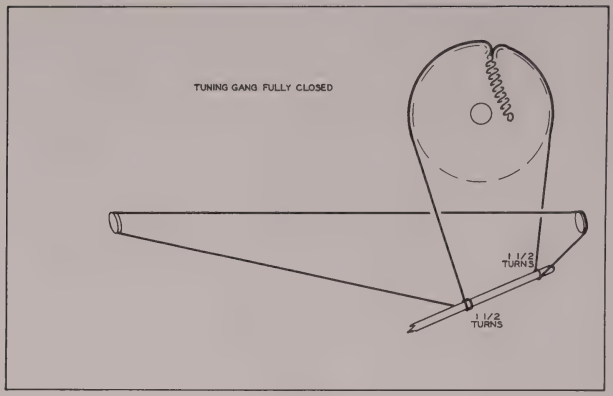
DISASSEMBLY INSTRUCTIONS

TV DISASSEMBLY

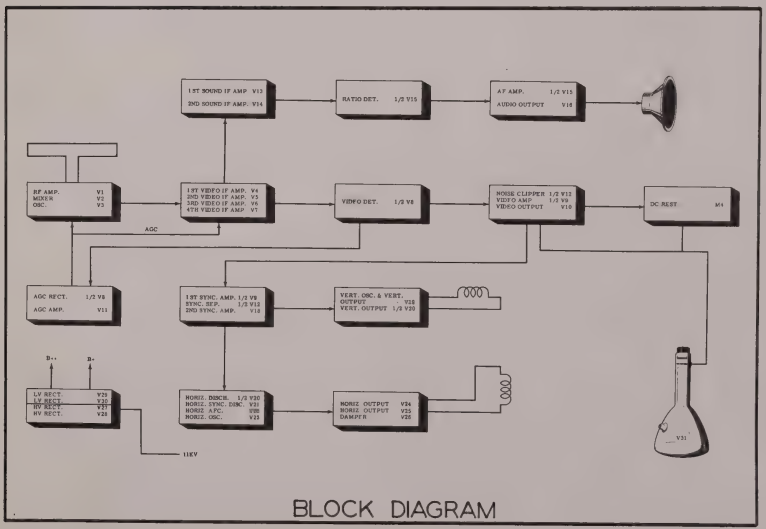
1. Remove five push-on type control knobs.
2. Disconnect rear cover power cord.
3. Remove ten screws holding rear cover. Lift up and remove cover.
4. Disconnect audio chassis power cord.
5. Remove audio plug.
6. Loosen two antenna terminal screws. Remove antenna leads.
7. Remove three screws holding chassis.
8. Remove two screws holding antenna trimmer bracket.
9. Free antenna trimmer shaft from rubber bushing.
10. Push trimmer aside and remove chassis.
11. Remove speaker jacks from audio chassis.
12. Remove four screws and 11/32" hex nuts holding audio chassis. Remove chassis.
13. Remove four screws holding speaker. Remove speaker.

RADIO DISASSEMBLY

1. Remove two push-on type control knobs.
2. Remove phono motor and pick-up plugs.
3. Remove speaker jacks.
4. Remove power cord plug.
5. Remove AM and FM antenna leads from antenna terminal strip.
6. Remove three 1/4" hex head bolts holding chassis. Remove chassis.
7. Remove four screws holding speaker. Remove speaker.

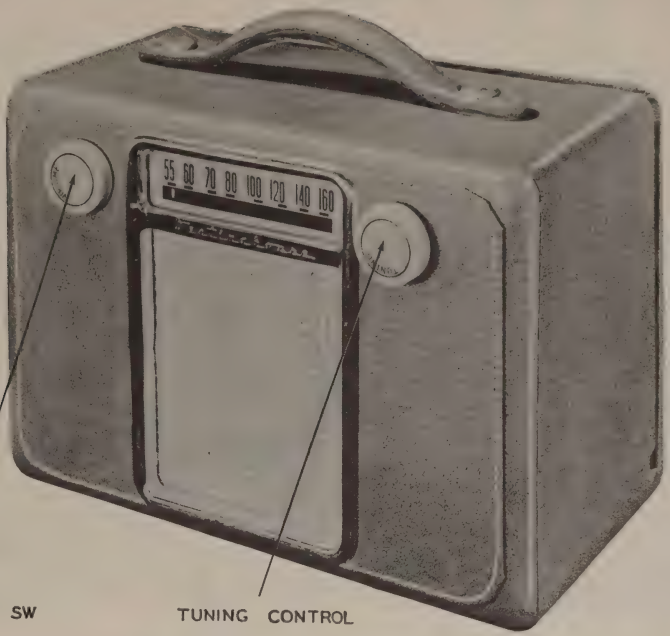


DIAL CORD DRIVE



BLOCK DIAGRAM

WESTINGHOUSE MODEL H-302P5
(Ch. V-2151-1) (BATTERY-LINE OPERATED)



WESTINGHOUSE MODEL H-302P5
(Ch. V-2151-1) (BATTERY-LINE OPERATED)

WESTINGHOUSE MODEL H-302P5

TRADE NAME	Westinghouse, Model H-302P5 (Ch. V-2151-1)
MANUFACTURER	Westinghouse Electric Corp., Receiver Div., Sunbury, Pa.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types 1U4 RF Amp., 1R5 Converter, 1U4 IF Amp., 1U5 DET-AVC-AF, 3V4 Power Output
POWER SUPPLY RATING	105-120 Volts AC-DC or 9 Volts "A" Supply and 90 Volts "B" Supply in Pack Form .18 Amp. at 117 Volts AC or 55MA at 9 Volts DC and 12MA at 90 Volts DC
TUNING RANGE—BROADCAST	540-1615KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully closed and set the pointer 5/16 inches to the right of the left hand end of the dial backplate (chassis inverted as in cabinet).

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to pin 6 (Grid) of 1R5 (V2). Low side to B-.	455KC (400 ∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	200MMF	High side to stator on rear section of tuning gang. Low side to B-.	1615KC	"	"	A5, A6	Adjust for maximum output.
3.	200MMF	"	600KC	Set pointer 3/4 inches to the right of the left hand end of dial backplate.	"	A7	Adjust for maximum output. Repeat steps 2 and 3 until no further improvement can be made.
4.		Loop	1400KC	Tune for max. output	"	A8	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE
MODEL H-302P5

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: WESTINGHOUSE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	1U4	1U4	6AR	
V2	Converter	1R5	1R5	7AT	
V3	IF Amp.	1U4	1U4	6AR	
V4	DET.-AVC-AF	1U5	1U5	6BW	
V5	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: Westinghouse PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	150	V-6552	AF12168D20A			● Filter
B	80	150					■ Filter
C	40	150					▲ Filter
D	100	25					Filament Bypass
C2	50	25	V-4636	PRS25/50		TA-50	Filament Bypass
C3	.05	200	V-6066-2503M	P285-05		68P16	AVC Filter
C4	.15	200	V-6066-2154M	P288-15		68P18	Line Isolation
C5	100	500	RCM20A101M	1468-0001	GP1K-100	1FM-31	RF Coupling
C6	220	500	RCM20A221M	1468-0002	GP2K-220	1FM-32	RF Coupling
C7	.05	200	V-6066-2503M	P285-05		68P16	Filament Bypass
C8	.05	200	V-6066-2503M	P285-05		68P16	Osc. Anode Decoupling
C9	.05	200	V-6066-2503M	P285-05		68P16	AVC Filter
C10	.15	200	V-6066-2154M	P288-15		68P18	Filament Bypass
C11	.002	600	V-6066-4204M	P485-002	GP2M-002	68P27	Audio Coupling
C12	.05	200	V-6066-2503M	P285-05		68P16	AF Amp. Screen Bypass
C13	.05	200	V-6066-2503M	P285-05		68P16	RF Bypass
C14	220	500	RCM20A221M	1468-00025	GP2K-220	1FM-325	AF Amp. Plate Bypass
C15	.0047	400	V-6066-4502M	P688-0047	811-005	TM-25	Audio Coupling
C16	.002	600	V-6066-4204M	P485-002	GP2M-002	68P27	Output Plate Bypass
C17	.05	400	V-6066-4503M	P488-05		68P10	Line Filter

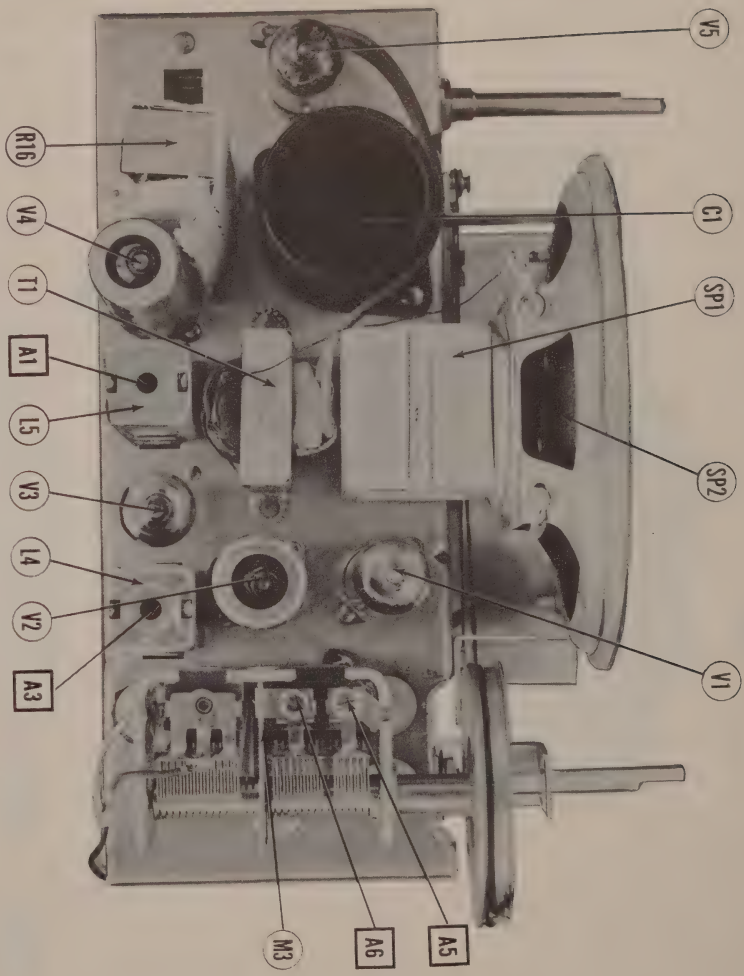
CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: Westinghouse PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	V-5666-3	Q13-133		Volume control
B	Switch		Not Req.	76-2		Attach to R1A per instructions

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: WESTINGHOUSE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R2	27KΩ	½	RC20AE273M	BTS-27K	RF Plate
R3	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Conv. Grid
R4	100KΩ	½	RC20AE104M	BTS-100K	Osc. Grid
R5	10KΩ	½	RC20AE103M	BTS-10K	Osc. Anode Decoupling
R6	6.8 Meg.	½	RC20AE685M	BTS-6.8 Meg.	AVC Network
R7	6.8 Meg.	½	RC20AE685M	BTS-6.8 Meg.	AVC Network
R8	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	AVC Network
R9	10 Meg.	½	RC20AE106M	BTS-10 Meg.	AF Amp. Grid
R10	1.5 Meg.	½	RC20AE155M	BTS-1.5 Meg.	AF Amp. Screen
R11	470KΩ	½	RC20AE474M	BTS-470K	AF Amp. Plate
R12	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Output Grid
R13	1000Ω	½	RC20AE102K	BTS-1000	Filament String
R14	2200Ω	½	RC20AE222K	BTS-2200	Filament String
R15	1000Ω	½	RC20AE102K	BTS-1000	Filament String
R16A	1285Ω	10	V-9125		Filter-Wire Wound
B	1285Ω				Filament Dropping-Wire Wound
R17	2200Ω	1	RC30AE222K	BW-1-2200	Filter
R18	22Ω	1	RC30AE220K		Surge Limiter
R19	220KΩ	½	RC20AE224M	BTS-220K	Isolation

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		Westinghouse	STANCOR	MERIT	CHICAGO	
	PRI.	SEC.	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	
T1	10.1KΩ	3.6Ω	410Ω	.52Ω	V-6567				

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA				INSTALLATION NOTES
			Westinghouse	JENSEN	QUAM		
			PART No.	PART No.	PART No.		
	FIELD	V. C. IMP.		ST-107			
SP1	PM	3.6Ω	V-6555	MOD. P5-V	5A07		
	CONE DIA.	V. C. DIA.					
SP2	4 1/2"	9/16"					

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
				Westinghouse	MEISSNER	
		PRI.	SEC.	PART No.	PART No.	
L1	Loop Ant.	3.8Ω		V-9401		With trimmer cap
L2	RF Coil	12Ω		V-6561		4Ω tap
L3	Osc. Coil	2.7Ω	12.5Ω	V-6661	14-1074	
L4	1st IF	19Ω	19Ω	V-6972-3	16-6668	
L5	2nd IF	25Ω	25Ω	V-6972-4	16-6669	

SELENIUM RECTIFIER

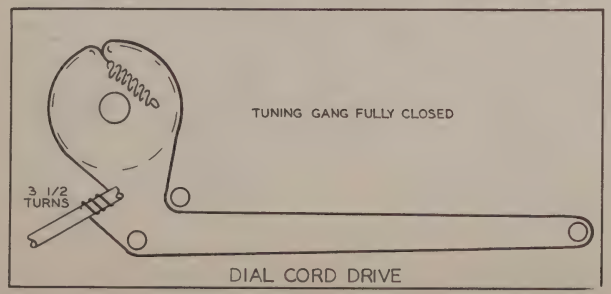
ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	WESTINGHOUSE PART No.	SYLVANIA PART No.		
M1	.065A	V-6558-1	NB-5		

BATTERIES

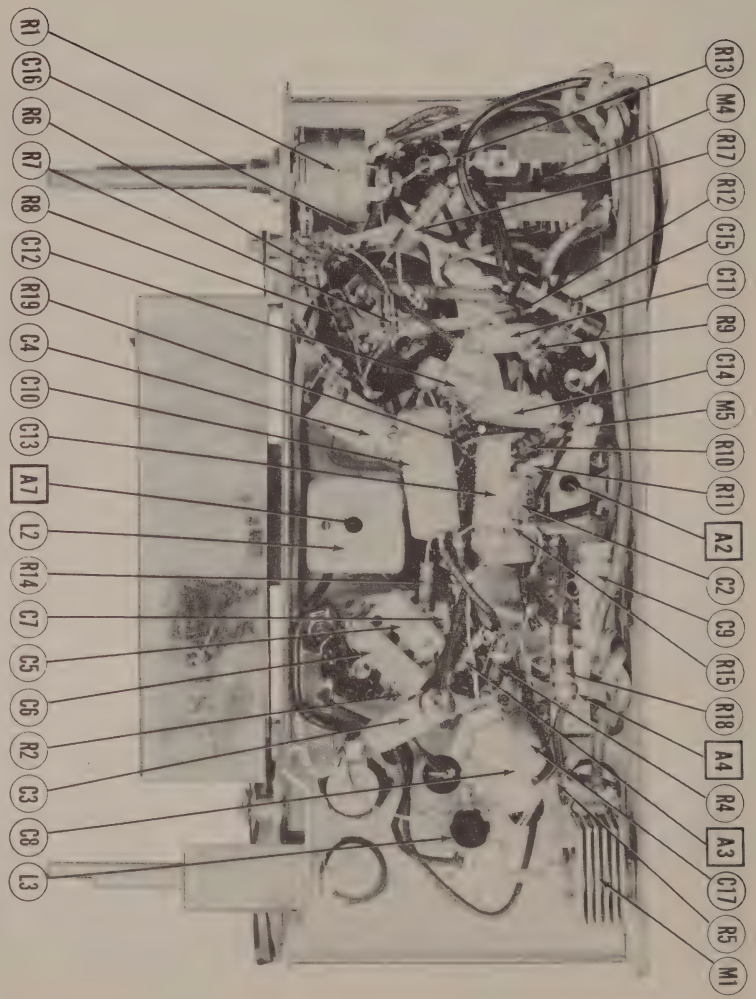
ITEM No.	VOLTAGE	Westinghouse PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	9V "A" 90V "B"	V9291			756			T6Z60	

MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
M3	3 Gang Var. Cap.	V-6556	(20-457MMF, 17-253MMF, 18-109MMF)
M4	Switch	V-6565	AC/DC-Battery
M5	Diode Filter	V-6232-2	
	Dial Scale	V-9390	
	Dial Pointer	V-6568	
	Cabinet	V-1195-1	
	Knob	V-9391-1	Volume
	Knob	V-9391-2	Tuning



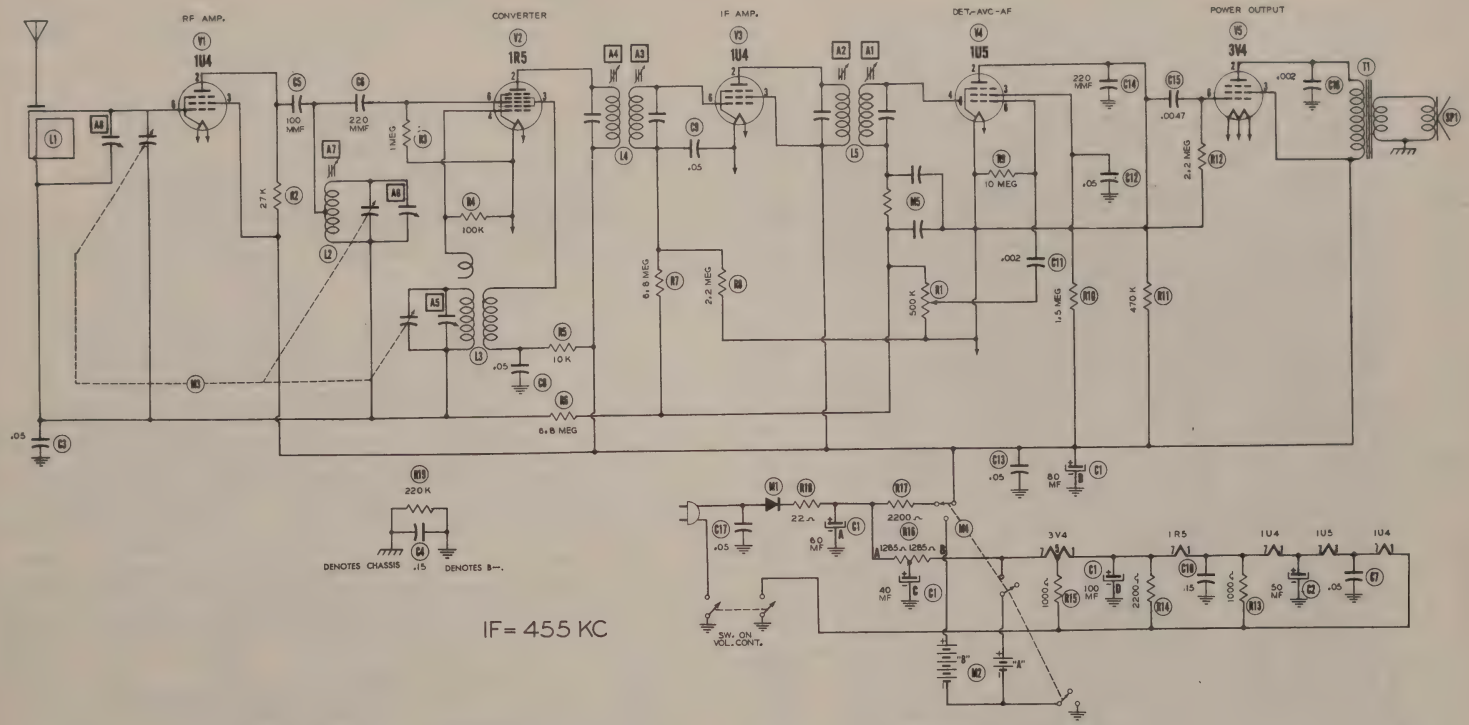
CHASSIS—BOTTOM VIEW



SET 91 FOLDER 15

WESTINGHOUSE MODEL H-302P5

WESTINGHOUSE MODEL H-302P5



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1U4	0V.	45VDC	95VDC	0V.	0V.	0V.	1.5VDC
V 2	1R5	4.2VDC	95VDC	70VDC	8-24VDC	4.2VDC	.6VDC	5.6VDC
V 3	1U4	2.8VDC	95VDC	100VDC	0V.	2.8VDC	.2VDC	4.2VDC
V 4	1U5	1.5VDC	23VDC	27VDC	.3VDC	1.5VDC	.1VDC	2.8VDC
V 5	3V4	5.6VDC	95VDC	100VDC	0V.	6.8VDC	.1VDC	8.4VDC

‡ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1U4	*	†27KΩ	†2.2KΩ	Inf.	*	6 Meg.	*
V 2	1R5	*	†2.2KΩ	†12KΩ	100KΩ	*	1 Meg.	*
V 3	1U4	*	†2.2KΩ	2.2KΩ	Inf.	*	1.5 Meg.	*
V 4	1U5	*	†470KΩ	†1.5 Meg.	550KΩ	*	10 Meg.	*
V 5	3V4	*	†2.2KΩ	†2.2KΩ	Inf.	*	2 Meg.	*

* DO NOT USE OHMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM JUNCTION OF R18 AND M1.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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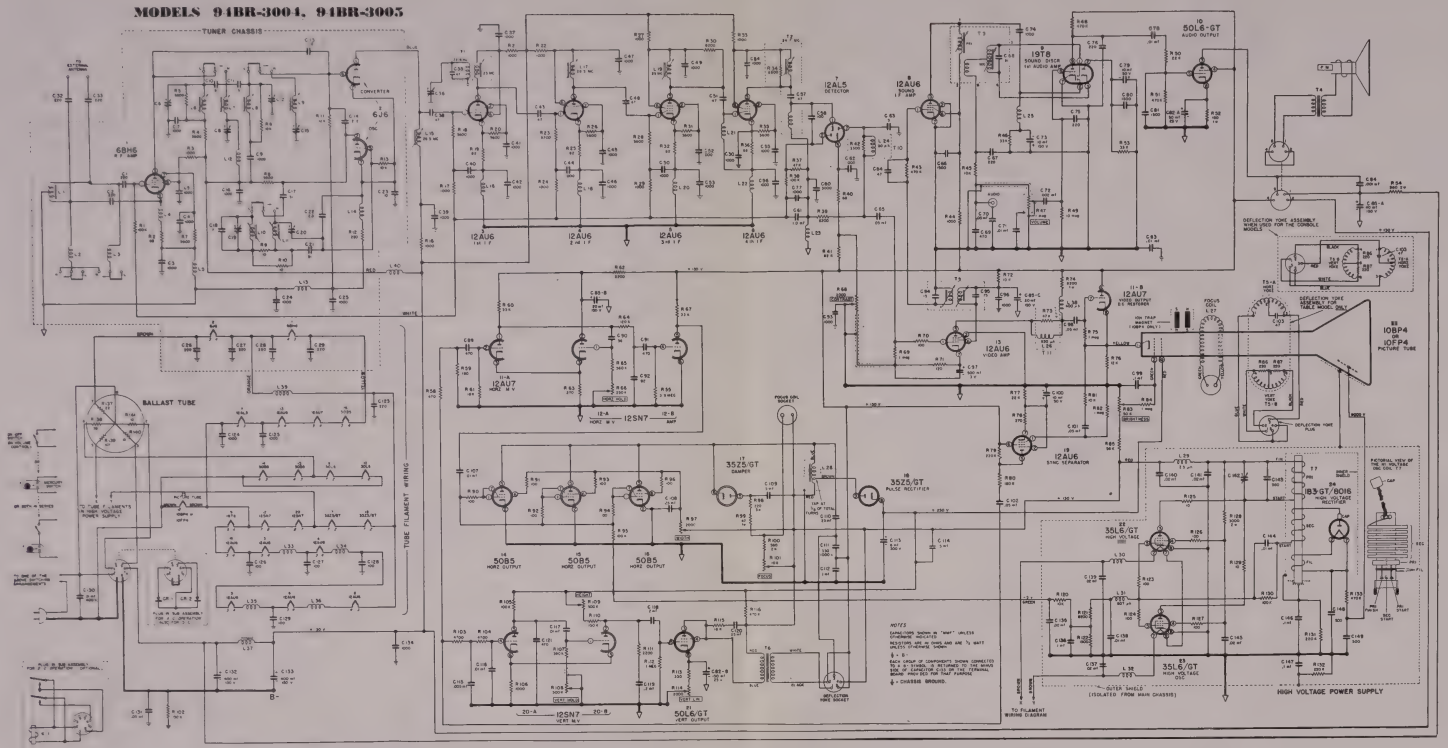
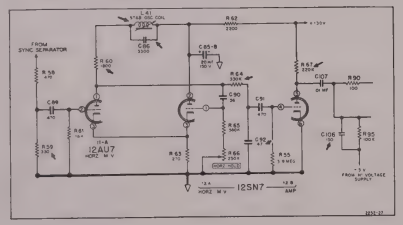
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.





COMPONENTS AFFECTED

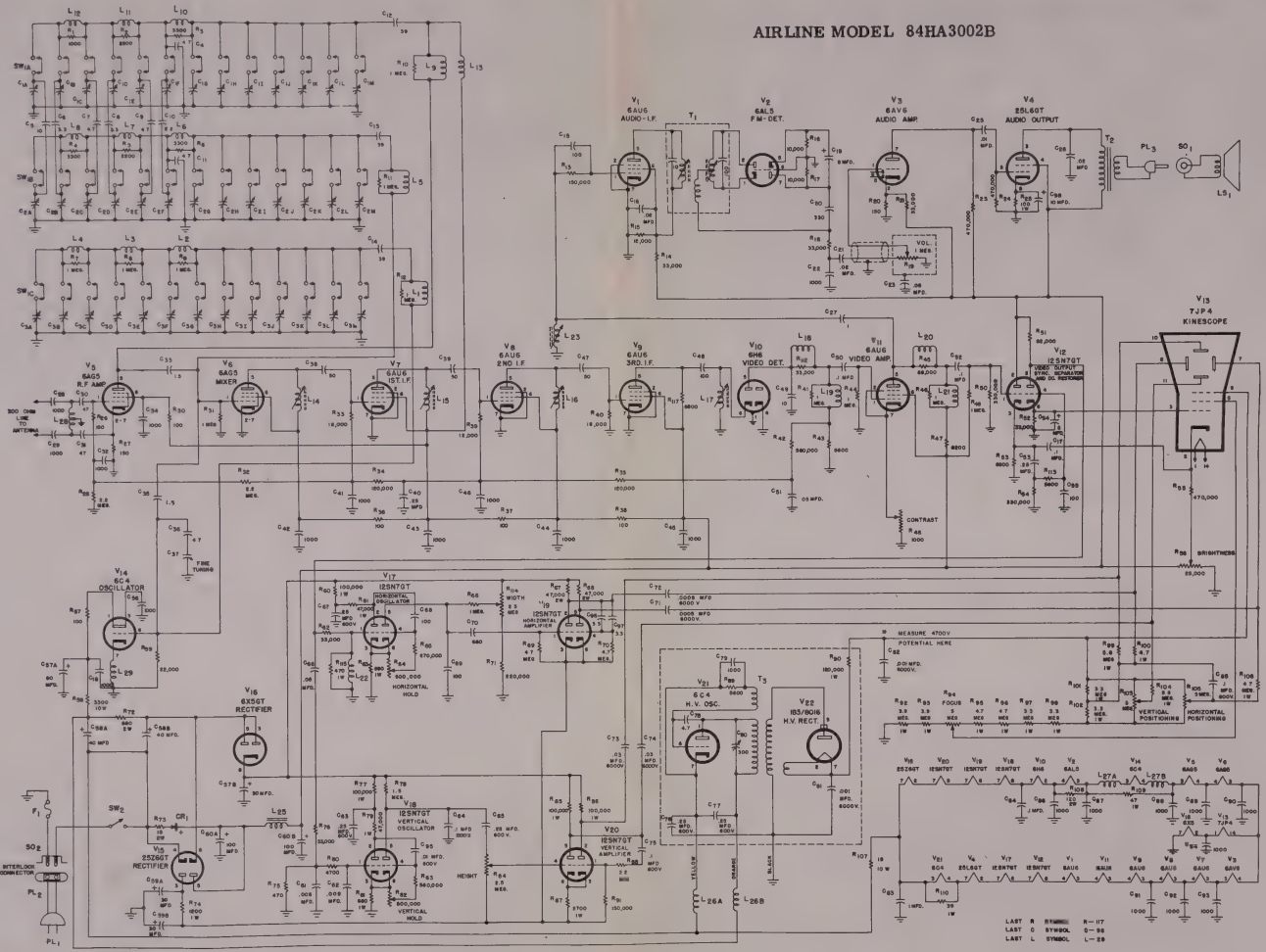
L41, oscillator coil, added
R59 from 180 ohms to 330 ohms
R60 from 33,000 ohms to 1800 ohms
R64 from 120,000 ohms to 330,000 ohms
R67 from 33,000 ohms to 220,000 ohms
C86 (3300 mmf) added
C92 from 82 mmf to 47 mmf
C106 (150 mmf) added

MODELS 94BR-3004C, 94BR-3005C
Receivers incorporating these changes have been marked "C" on the rear of the chassis

Resistor R95 was changed from 100,000 ohms to 39,000 ohms (part number C-9B1-81) to prevent the occurrence of a vertical white streak in the picture if a high-gain 12AU7 (tube 11) should be used.

On some earlier sets, cores with green-painted ends (instead of red) were used in coils L7 and L9 (see Figures 34 and 39). The part number for these cores is A-51A-15714, and for the coils in which they are used, A-201-15675. These coils and cores should be used as a combination.

AIRLINE MODEL 84HA3002B



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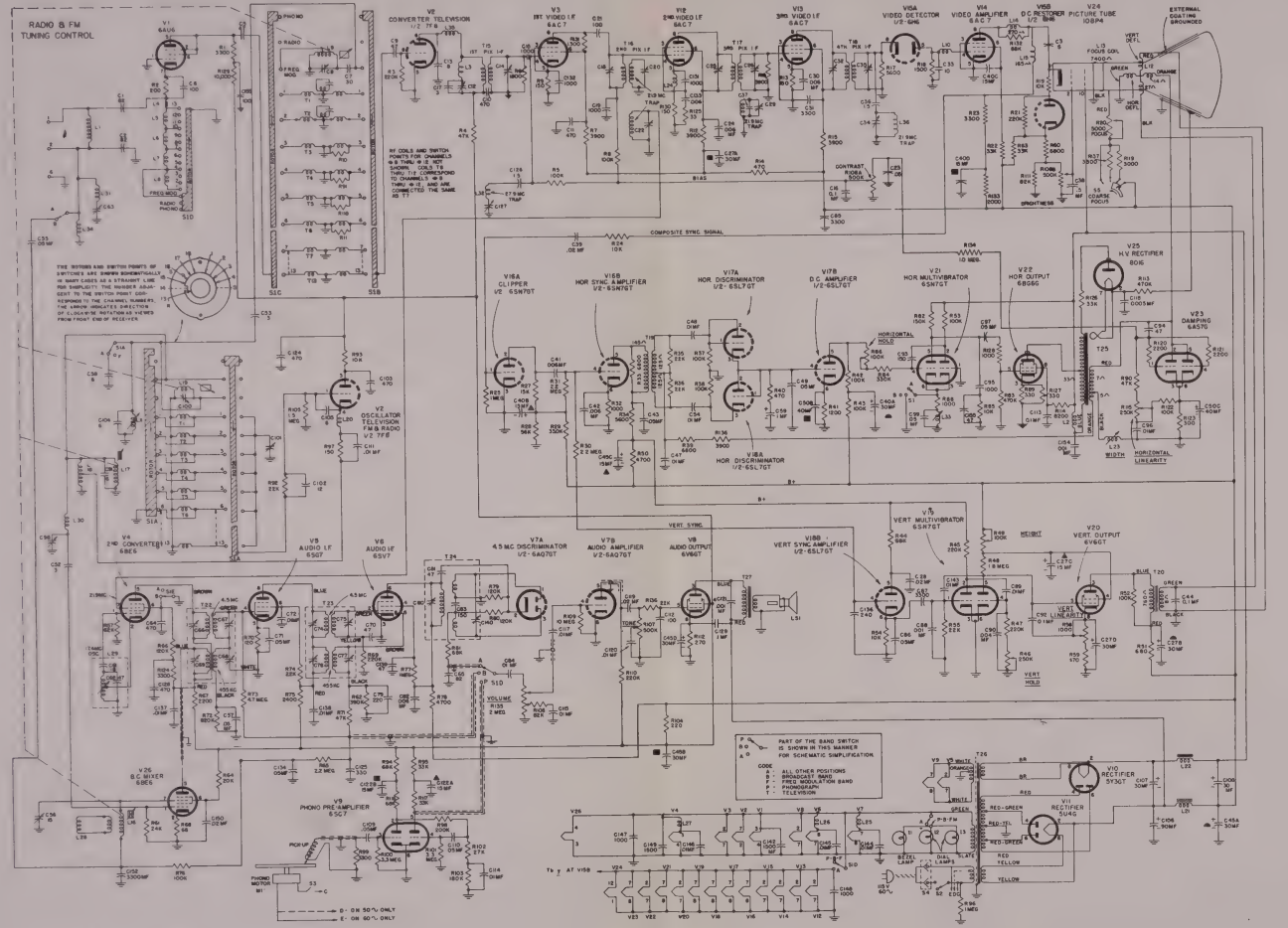
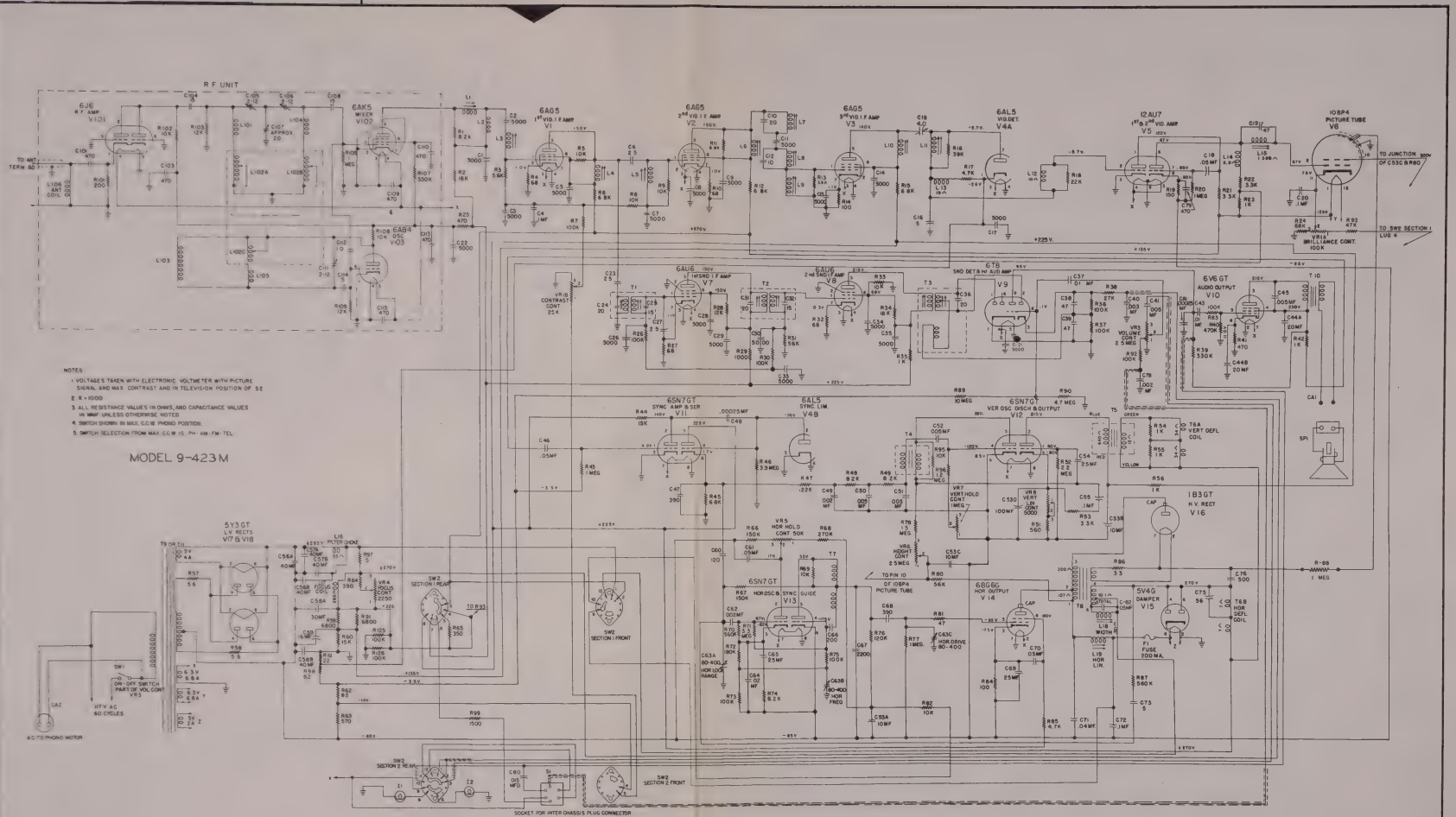


GENERAL ELECTRIC MODEL 802


R F UNIT
6J6 R F AMP V1O1
6AK5 MIXER V1O2
6AG5 1ST VIO I F AMP V1
6AB5 2ND VIO I F AMP V2
6AG5 3RD VIO I F AMP V3
6AL5 VIO DET V4A
12AU7 1ST 2ND VID AMP V5
10BP4 PICTURE TUBE V8
6AB4 OSC V03
6AU6 1ST SND I F AMP V7
6AU6 2ND SND I F AMP V8
6T8 SND DET & 1ST AUDIO AMP V9
6V6GT AUDIO OUTPUT V10
6SN7GT SYNC AMP & SER V11
6AL5 SYNC LIM V4B
6SN7GT VER OSC & OUTPUT V10
6SN7GT HOR OSC & SYNC GUIDE V13
6BG6G HOR OUTPUT V14
1B3GT H V RECT V16
5V4G DAMPER V15
5Y3GT LV RECTS V17 & V18
MODEL 9-423M
NOTES
1 VOLTAGES TAKEN WITH ELECTRONIC VOLTMETER WITH PICTURE SIGNAL AND MAX CONTRAST AND IN TELEVISION POSITION OF S2
2 K = 1000
3 ALL RESISTANCE VALUES IN OHMS, AND CAPACITANCE VALUES IN MMF UNLESS OTHERWISE NOTED
4 SWITCH SHOWN IN MAX C.C.W. PHONO POSITION.
5 SWITCH SELECTION FROM MAX C.C.W. IS PH-AM-FM-TEL
SOCKET FOR INTER CHASSIS PLUG CONNECTOR

PRELIMINARY DATA

SET 91A FOLDER 4,7

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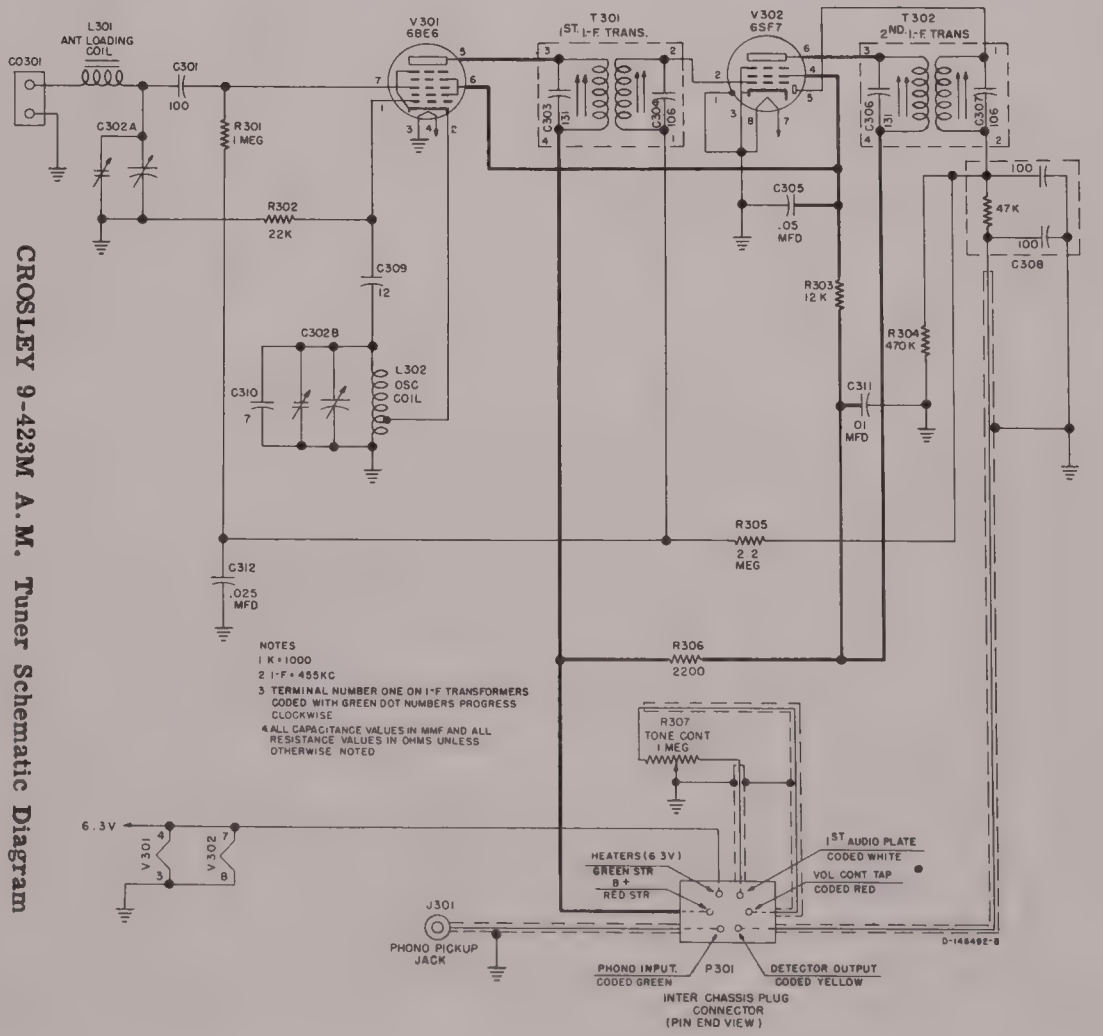
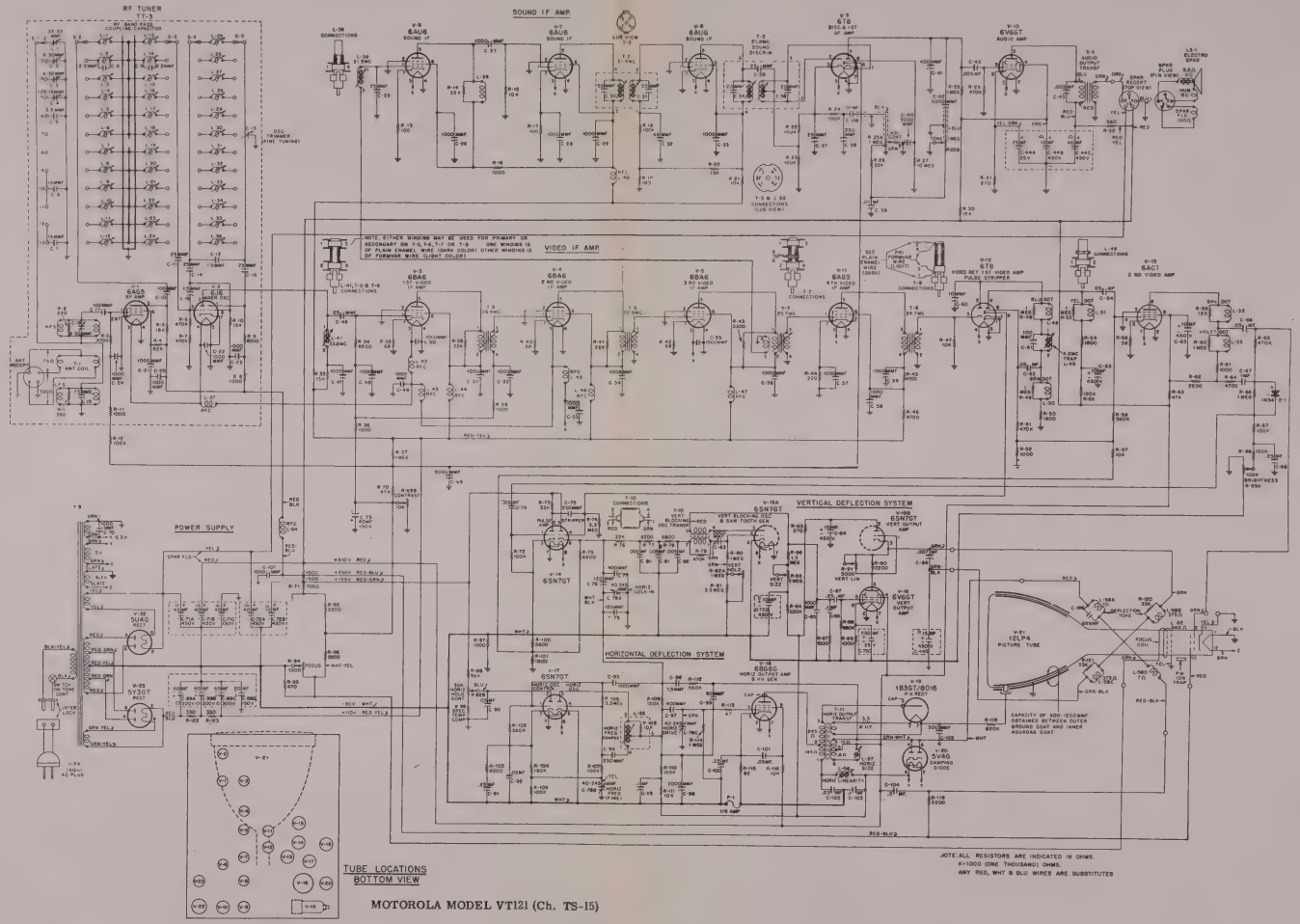
CROSLEY 9-423M A.M. Tuner Schematic Diagram





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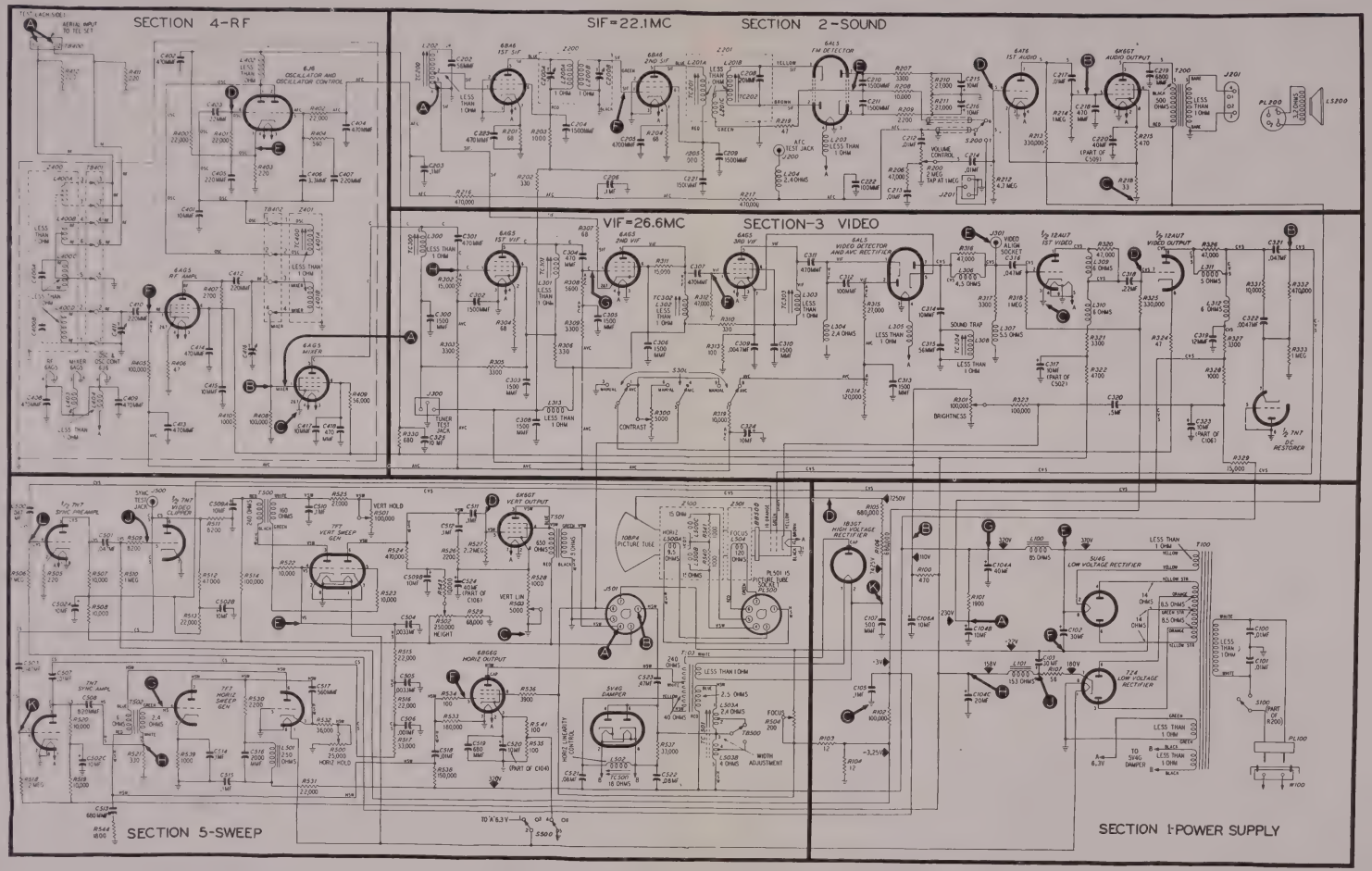
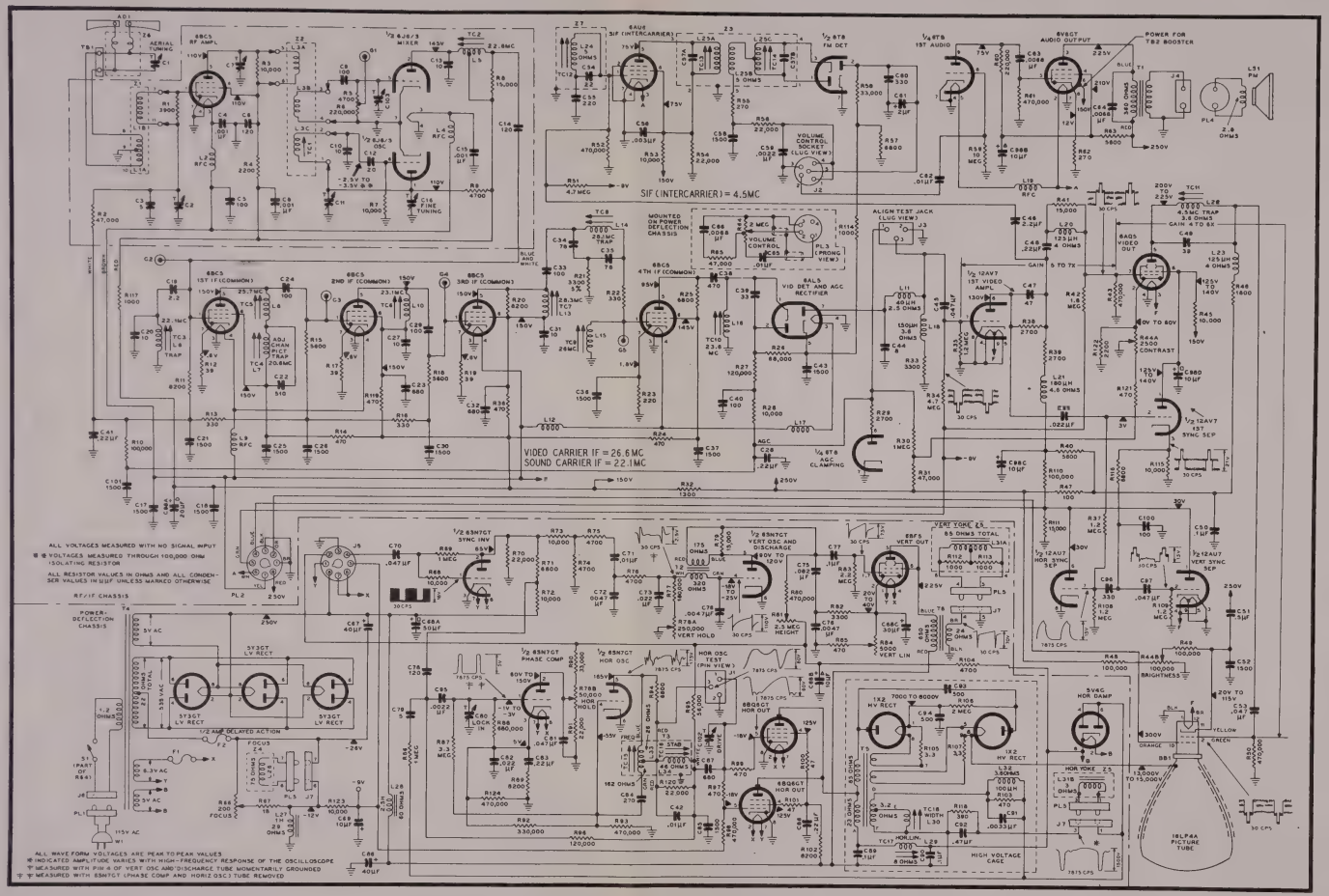


PHILCO MODELS 49-1002 (Code 121), 49-1040 (Code 121)
NOTE: R544 not used in 49-1002.


SIF (INTERCARRIER) = 4.5MC
VIDEO CARRIER IF = 26.6 MC.
SOUND CARRIER IF = 22.1MC
ALL VOLTAGES MEASURED WITH NO SIGNAL INPUT
ALL VOLTAGES MEASURED THROUGH 100,000 OHM ISOLATING RESISTOR
ALL RESISTOR VALUES IN OHMS AND ALL CONDENSER VALUES IN µµF UNLESS MARKED OTHERWISE.
ALL WAVE FORM VOLTAGES ARE PEAK TO PEAK VALUES
* INDICATED AMPLITUDE VARIES WITH HIGH-FREQUENCY RESPONSE OF THE OSCILLOSCOPE
† MEASURED WITH PIN A OF VERT. OSC. AND DISCHARGE TUBE MOMENTARILY GROUNDED
‡ MEASURED WITH 6SN7GT (PHASE COMP. AND HORIZ. OSC.) TUBE REMOVED
POWER-DEFLECTION CHASSIS
RF/IF CHASSIS
ALIGN TEST JACK (LUG VIEW) J3
VOLUME CONTROL SOCKET (LUG VIEW) J2
VOLUME CONTROL (PRONG VIEW) PL3
VERT YOKE Z5
HOR YOKE Z5
18LP4A PICTURE TUBE
HIGH VOLTAGE CAGE
POWER FOR TB2 BOOSTER

PHILCO MODELS 50-T1600, 50-T1632, 50-T1633

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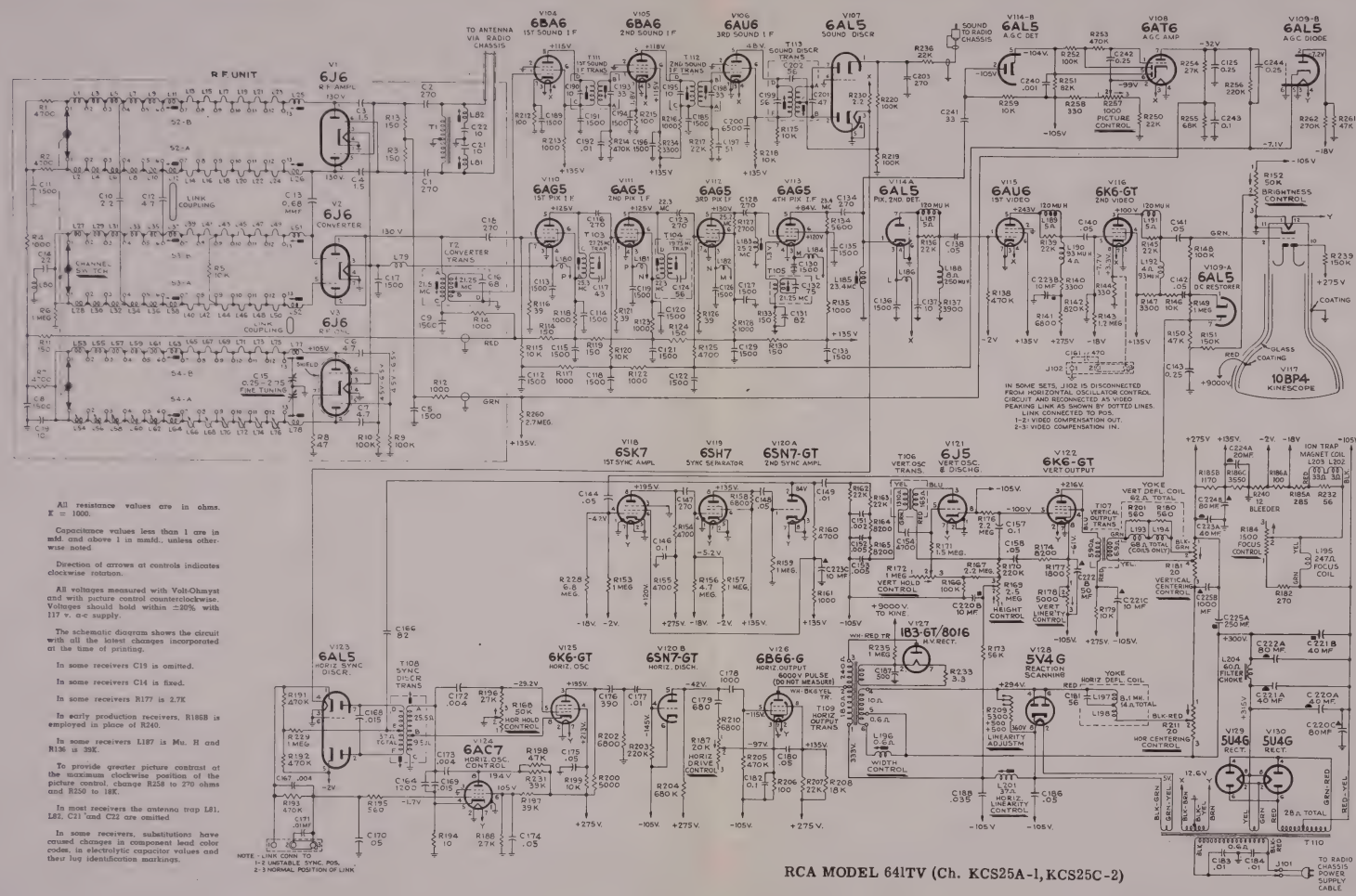


All resistance values are in ohms. K = 1000.

Capacitance values less than 1 are in mfd. and above 1 in mmfd., unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

All voltages measured with Volt-Ohmyst and with picture control counterclockwise. Voltages should hold within ±20% with 117 v. a-c supply.

The schematic diagram shows the circuit with all the latest changes incorporated at the time of printing.

In some receivers C19 is omitted.

In some receivers C14 is fixed.

In some receivers R177 is 2.7K

In early production receivers, R186B is employed in place of R240.

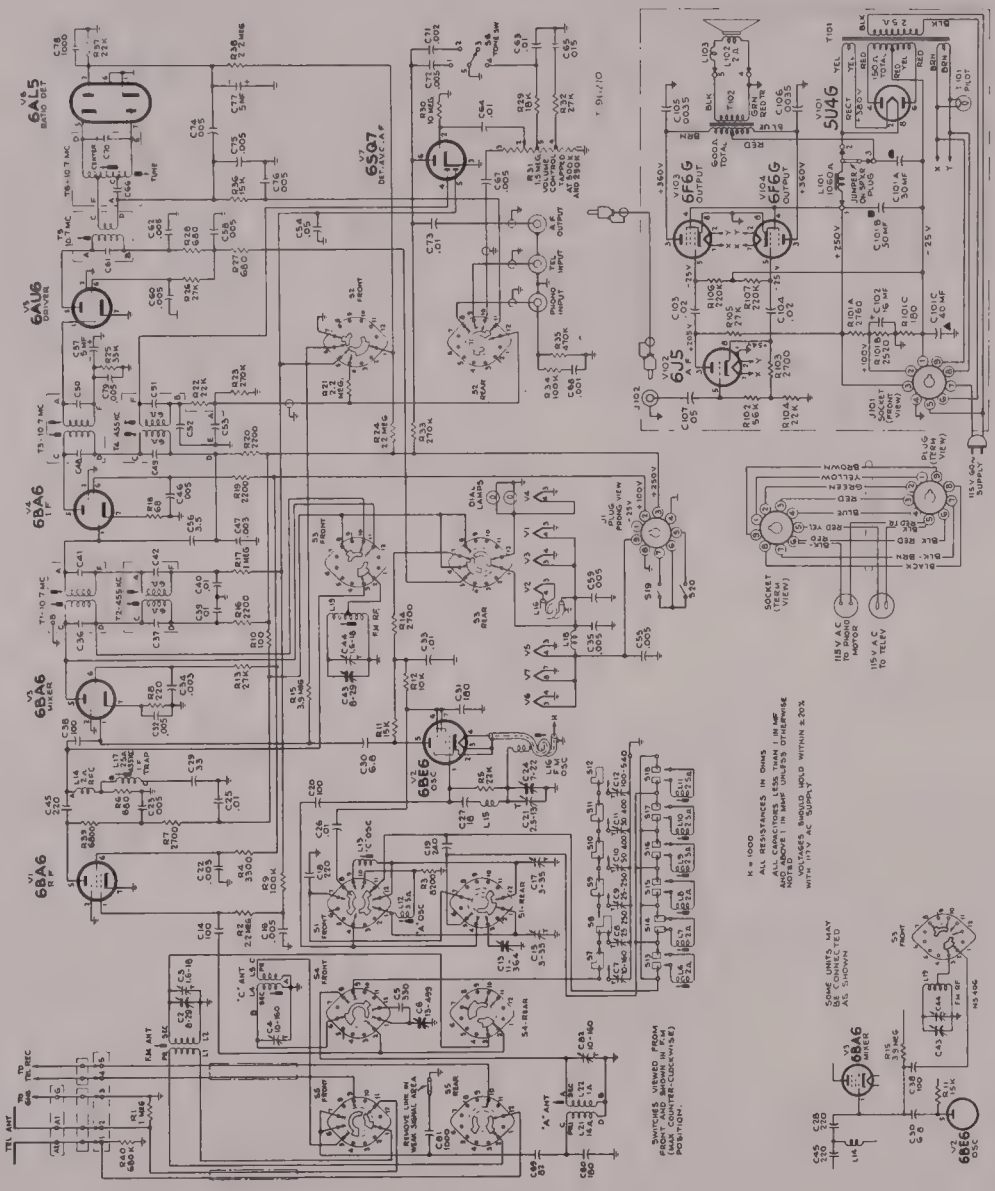
In some receivers L187 is Mu. H and R136 is 39K.

To provide greater picture contrast at the maximum clockwise position of the picture control, change R258 to 270 ohms and R250 to 18K.

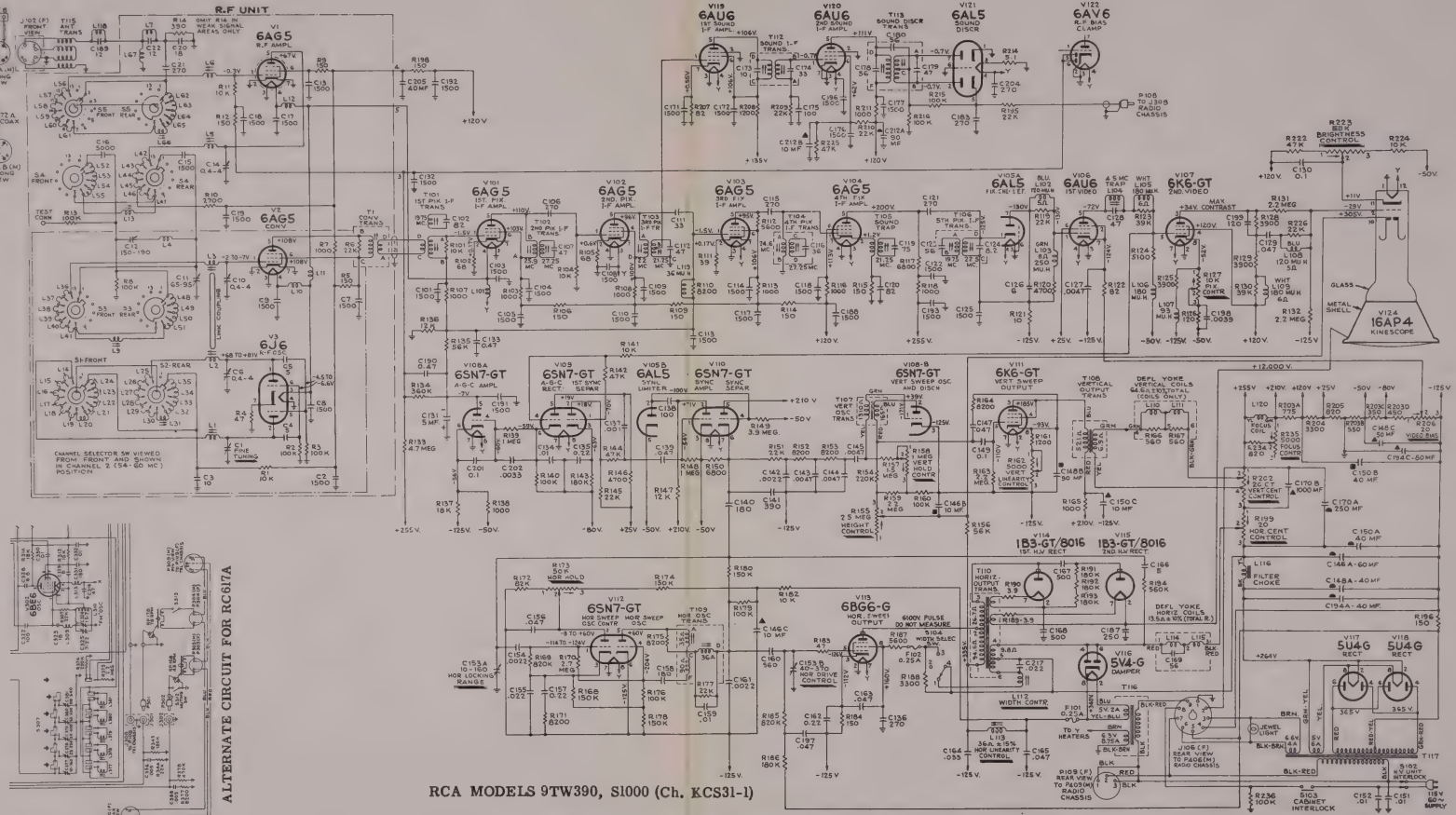
In most receivers the antenna trap L81, L82, C21 and C22 are omitted.

In some receivers, substitutions have caused changes in component lead color codes, in electrolytic capacitor values and their lug identification markings.

RCA MODEL 641TV (Ch. KCS25A-1, KCS25C-2)



RCA MODEL 641TV (Ch. RK117A, RS123A)



All resistance values in ohms. K = 1000. All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Coil resistance values less than 1 ohm are not shown.

Direction of arrows at controls indicates clockwise rotation.

In some receivers, substitutions have caused changes in component lead color codes, in electrolytic capacitor values and their lug identification markings.

All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

In some receivers C146B was 10 MF and a 60 MF tubular condenser was connected in parallel with it.

In weak signal areas, R14 may be disconnected and L66 peaked for best picture on the weakest low channel station.

PRELIMINARY DATA

SET 91A FOLDER 11

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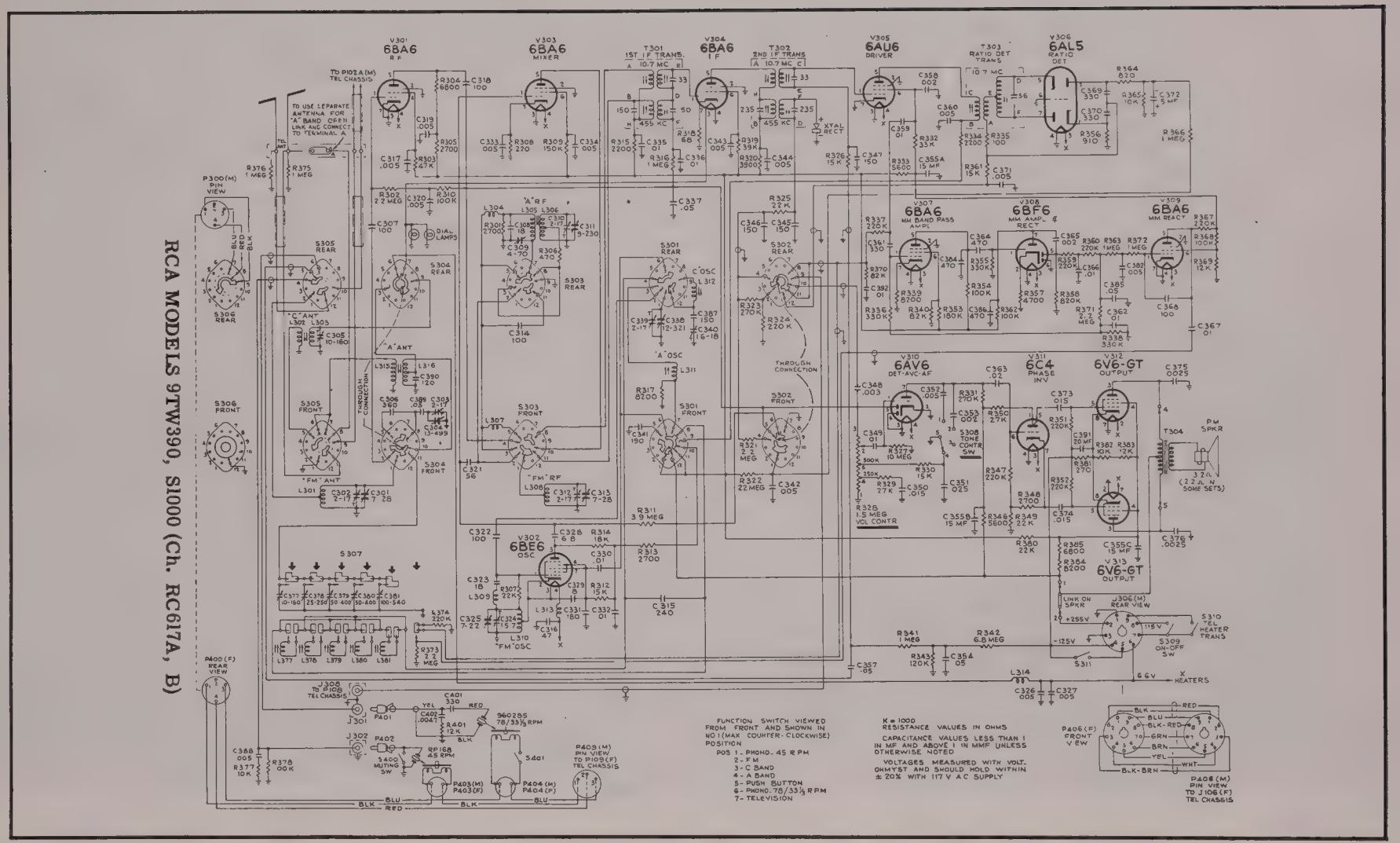
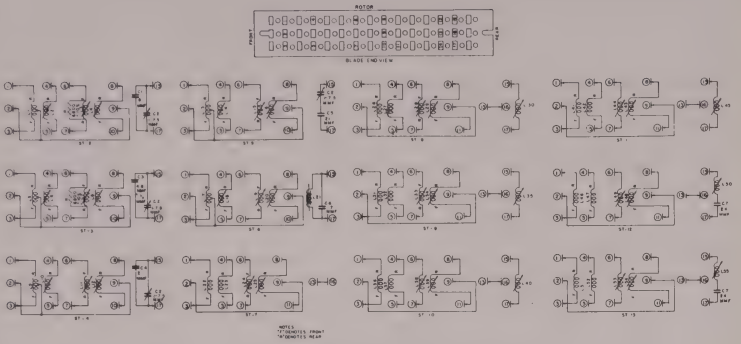
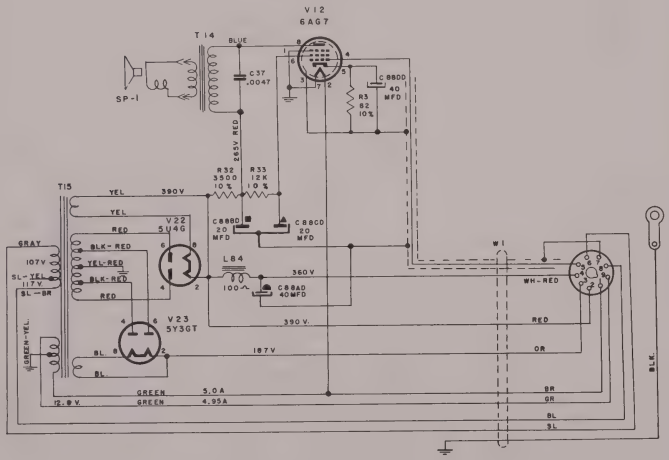
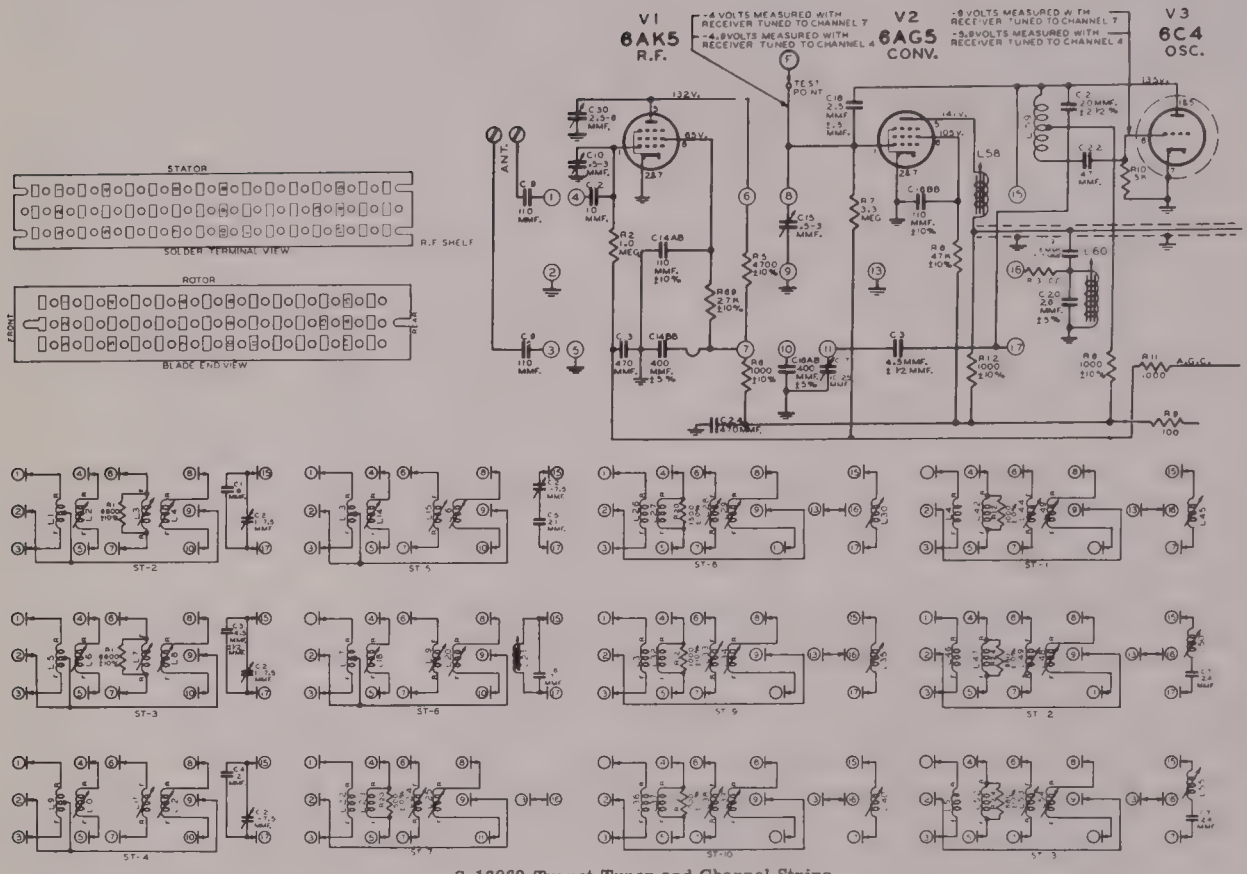

RCA MODELS 9TW390, S1000 (Ch. RC617A, B)
V301 6BA6 RF
V303 6BA6 MIXER
V304 6BA6 IF
V305 6AU6 DRIVER
V306 6AL5 RATIO DET
V307 6BA6 MM BAND PASS AMPL
V308 6BF6 MM AMPL & RECT
V309 6BA6 MM REACT
V310 6AV6 DET-AVC-AF
V311 6C4 PHASE INV
V312 6V6-GT OUTPUT
V313 6V6-GT OUTPUT
V302 6BE6 OSC
T301 1ST I.F TRANS. 10.7 MC
T302 2ND I.F TRANS 10.7 MC
T303 RATIO DET TRANS 10.7 MC
T304
P PM SPKR
3.2Ω (2.2Ω IN SOME SETS)
TO P102A(M) TEL CHASSIS
TO USE SEPARATE ANTENNA FOR "A" BAND OPEN LINK AND CONNECT TO TERMINAL A
P300(M) PIN VIEW
S305 REAR
S304 REAR
S306 REAR
S303 REAR
S301 REAR
S306 FRONT
S305 FRONT
S304 FRONT
S303 FRONT
S302 FRONT
S301 FRONT
S307
S308 TONE CONTR SW
S309 ON-OFF SW
S310 "EL HEATER TRANS
S311
"C" ANT
"A" ANT
"FM" ANT
"A" RF
"FM" RF
"A" OSC
"FM" OSC
THROUGH CONNECTION
DIAL LAMPS
R326 1.5 MEG VOL CONTR
J306(M) REAR VIEW
LINK ON SPKR
+255V
-125V
115V
6.6V HEATERS
P400(F) REAR VIEW
J300 TO P108 TEL CHASSIS
J301
J302
P401
P402
P403(M) P403(F)
P404(M) P404(F)
P409(M) PIN VIEW TO P109(F) TEL CHASSIS
S401
S400 MUTING SW
960285 78/33⅓ RPM
RP168 45 RPM
P406(F) FRONT VIEW
P406(M) PIN VIEW TO J106(F) TEL CHASSIS
FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN NO.1 (MAX COUNTER-CLOCKWISE) POSITION
POS 1 - PHONO. 45 R P M
2 - F M
3 - C BAND
4 - A BAND
5 - PUSH BUTTON
6 - PHONO. 78/33⅓ R P M
7 - TELEVISION
K = 1000
RESISTANCE VALUES IN OHMS
CAPACITANCE VALUES LESS THAN 1 IN MF AND ABOVE 1 IN MMF UNLESS OTHERWISE NOTED
VOLTAGES MEASURED WITH VOLT-OHMYST AND SHOULD HOLD WITHIN ± 20% WITH 117 V A C SUPPLY



Channel Strips for S-16203 Turret Tuner.

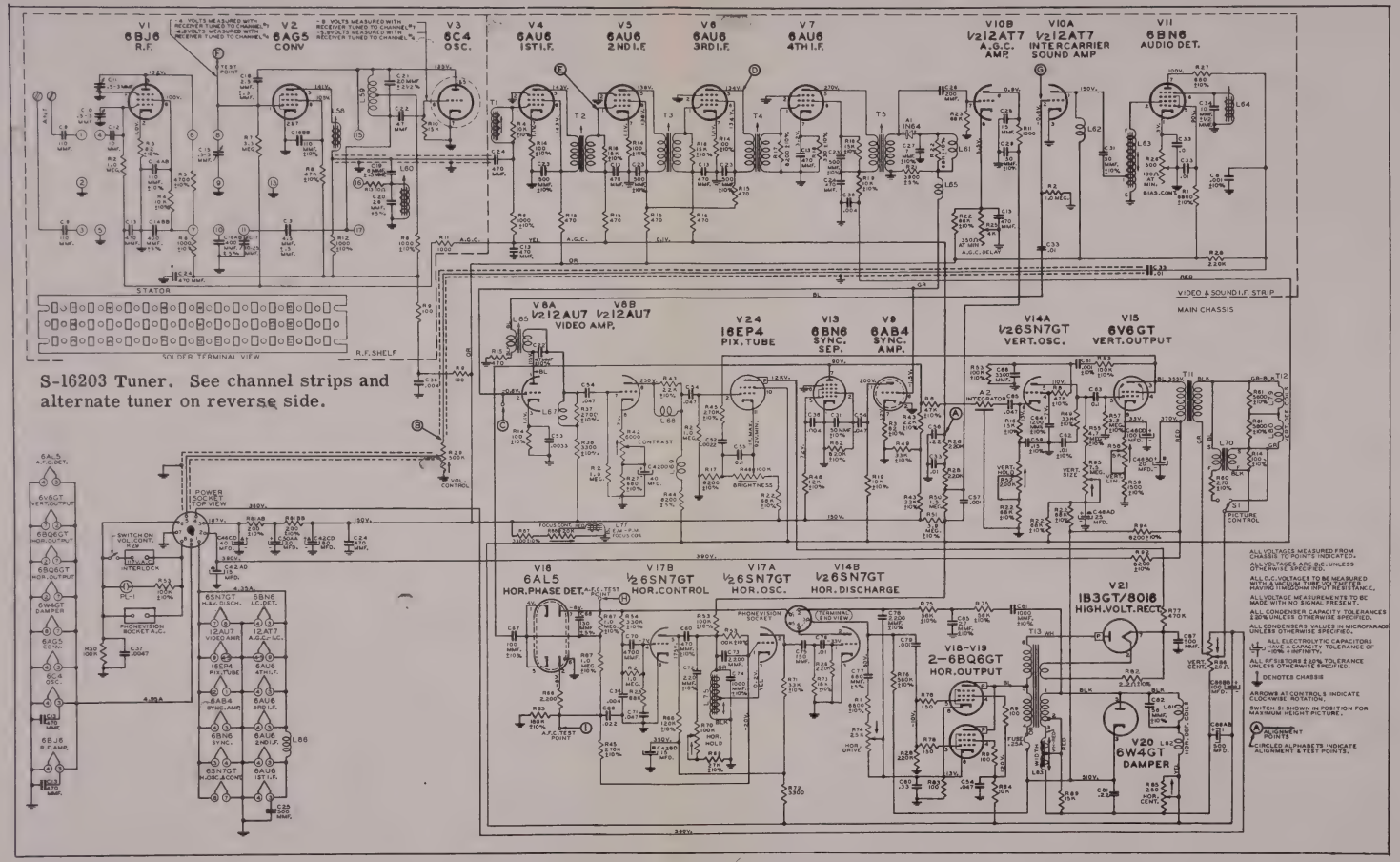


Power Supply for 24G26 Chassis.



S-16960 Turret Tuner and Channel Strips.

ZENITH
CHASSIS 24G26



S-16203 Tuner. See channel strips and alternate tuner on reverse side.

ZENITH Chassis 24G26

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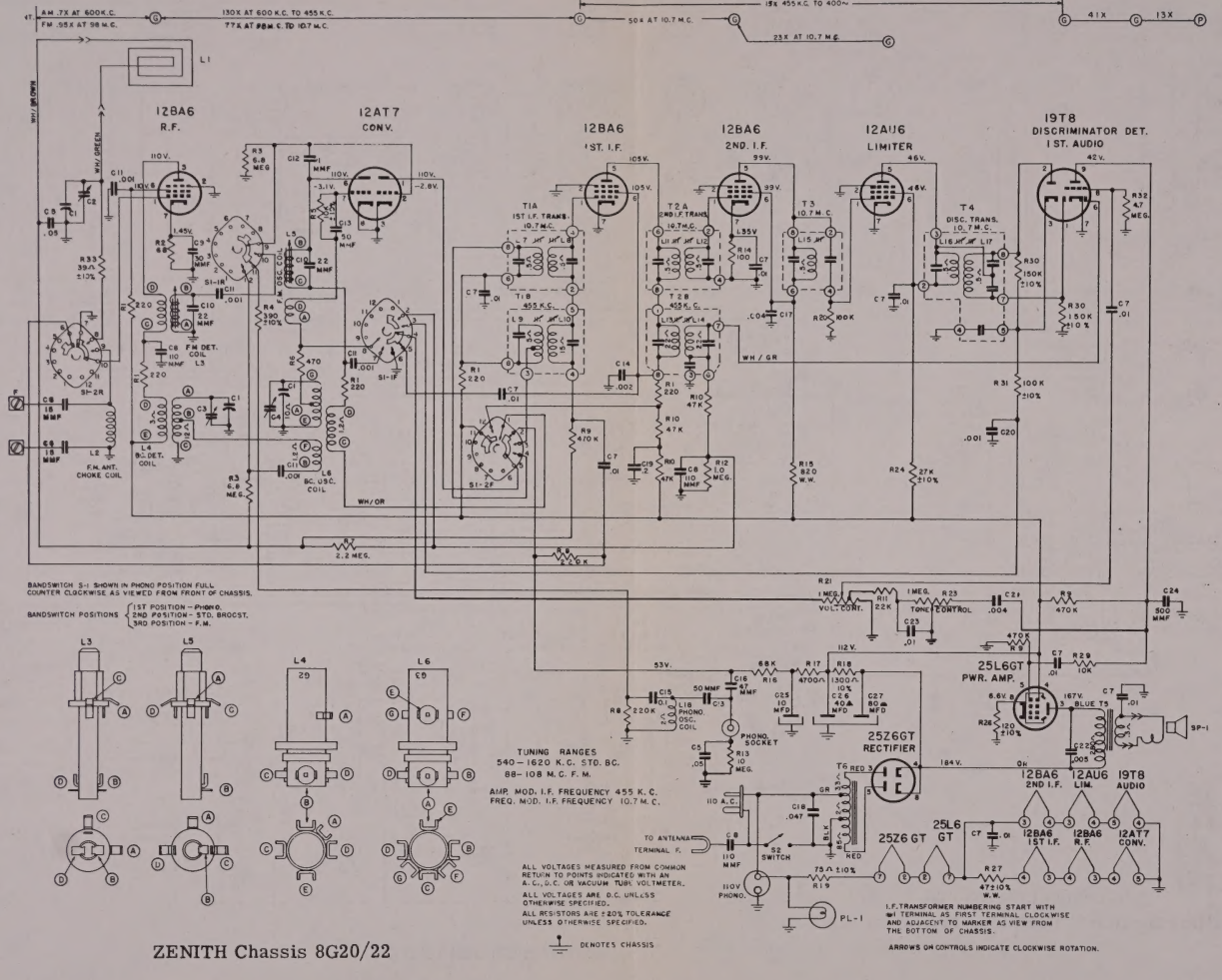
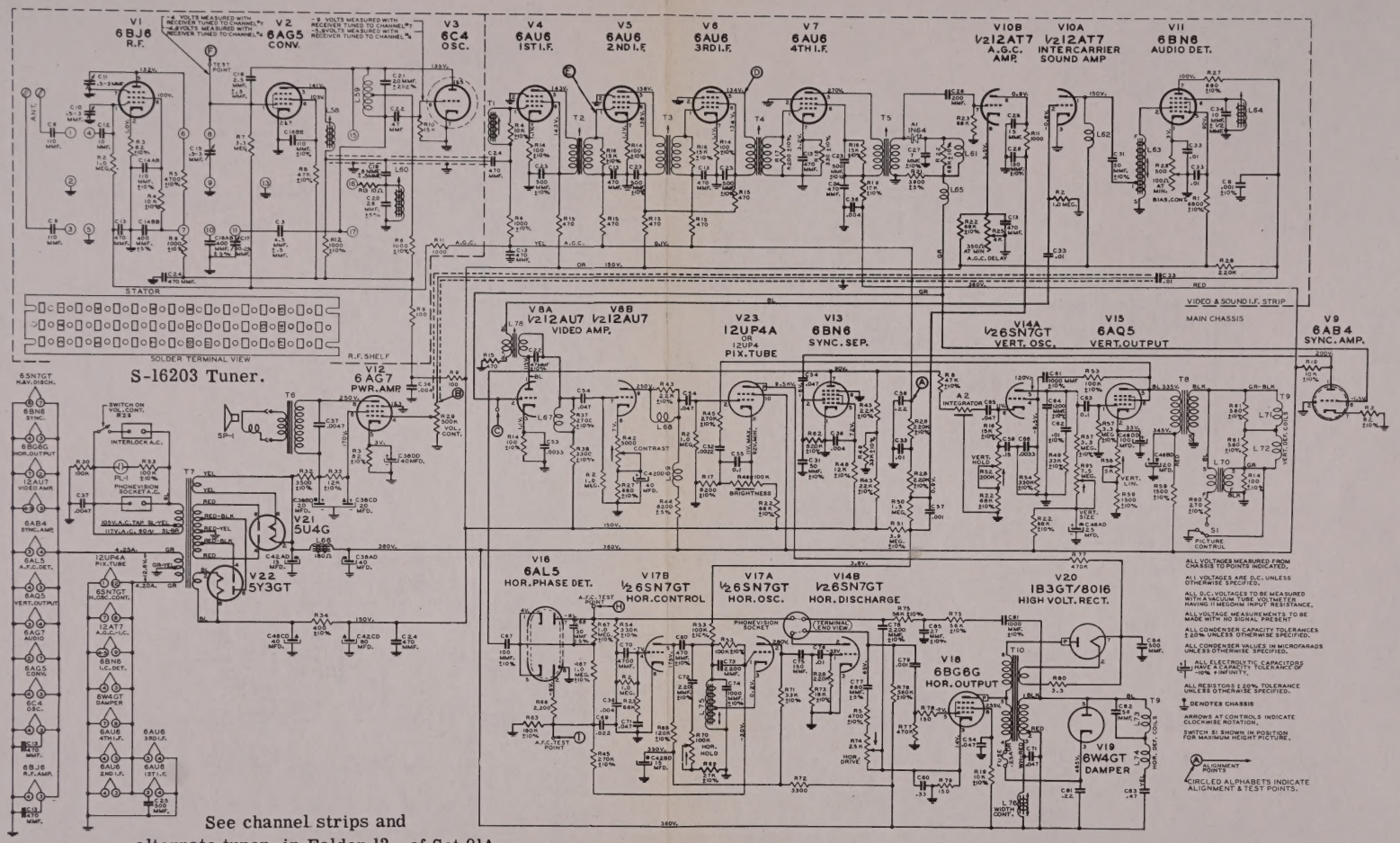

AM .7X AT 600K.C.
FM .95X AT 98 M.C.
130X AT 600 K.C. TO 455 K.C.
77X AT 98M.C. TO 10.7 M.C.
15X 455K.C. TO 400~
50X AT 10.7 M.C.
23X AT 10.7 M.C.
41X
13X
12BA6 R.F.
12AT7 CONV.
12BA6 1ST. I.F.
12BA6 2ND. I.F.
12AU6 LIMITER
19T8 DISCRIMINATOR DET. 1ST. AUDIO
25L6GT PWR. AMP.
25Z6GT RECTIFIER
BANDSWITCH S-1 SHOWN IN PHONO POSITION FULL COUNTER CLOCKWISE AS VIEWED FROM FRONT OF CHASSIS.
BANDSWITCH POSITIONS 1ST POSITION - PHONO. 2ND POSITION - STD. BROCST. 3RD POSITION - F.M.
TUNING RANGES 540 - 1620 K.C. STD. BC. 88 - 108 M. C. F. M.
AMP. MOD. I.F. FREQUENCY 455 K. C. FREQ. MOD. I.F. FREQUENCY 10.7 M. C.
ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH AN A.C., D.C. OR VACUUM TUBE VOLTMETER.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
DENOTES CHASSIS
I.F. TRANSFORMER NUMBERING START WITH ant TERMINAL AS FIRST TERMINAL CLOCKWISE AND ADJACENT TO MARKER AS VIEW FROM THE BOTTOM OF CHASSIS.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION.
TO ANTENNA TERMINAL F.
110 A.C.
PHONO. SOCKET
PHONO. OSC. COIL
FM ANT. SMOKE COIL
BC. OSC. COIL
FM DET. COIL
BC. DET. COIL
BC. ANT. COIL
1ST I.F. TRANS.
2ND I.F. TRANS.
DISC. TRANS.
TONE CONTROL
VOL. CONT.
PWR. AMP.
RECTIFIER
SWITCH
PL-1
SP-1
BLUE T5
RED
GR
WH/GR
WH/OR
WH/BROWN
WH/GREEN

ZENITH Chassis 8G20/22


V1 6BJ6 R.F.
V2 6AG5 CONV.
V3 6C4 OSC.
V4 6AU6 1ST I.F.
V5 6AU6 2ND I.F.
V6 6AU6 3RD I.F.
V7 6AU6 4TH I.F.
V10B ½12AT7 A.G.C. AMP.
V10A ½12AT7 INTERCARRIER SOUND AMP
V11 6BN6 AUDIO DET.
V8A ½12AU7 VIDEO AMP.
V8B ½12AU7
V23 12UP4A OR 12UP4 PIX. TUBE
V13 6BN6 SYNC. SEP.
V14A ½6SN7GT VERT. OSC.
V15 6AQ5 VERT. OUTPUT
V9 6AB4 SYNC. AMP.
V12 6AG7 PWR. AMP
V21 5U4G
V22 5Y3GT
V16 6AL5 HOR. PHASE DET.
V17B ½6SN7GT HOR. CONTROL
V17A ½6SN7GT HOR. OSC.
V14B ½6SN7GT HOR. DISCHARGE
V20 1B3GT/8016 HIGH VOLT. RECT.
V18 6BG6G HOR. OUTPUT
V19 6W4GT DAMPER
STATOR
SOLDER TERMINAL VIEW
R.F. SHELF
S-16203 Tuner.
VIDEO & SOUND I.F. STRIP
MAIN CHASSIS
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT
ALL CONDENSER CAPACITY TOLERANCES ± 20% UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL ELECTROLYTIC CAPACITORS HAVE A CAPACITY TOLERANCE OF -10% + INFINITY.
ALL RESISTORS ± 20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
DENOTES CHASSIS
ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION.
SWITCH S1 SHOWN IN POSITION FOR MAXIMUM HEIGHT PICTURE.
ALIGNMENT POINTS
CIRCLED ALPHABETS INDICATE ALIGNMENT & TEST POINTS.

See channel strips and alternate tuner in Folder 12 of Set 91A.

ZENITH Chassis 23G24

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